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ABSTRACT

This manual describes a physical fitness program for students with moderate and severe disabilities, which has as additional goals integration with nondisabled peers and improved attitudes of nondisabled peers toward students with disabilities. The first section presents background information, describes the program's development, and presents the data collected from the major research areas of the project (i.e., fitness, social interaction, and consumer satisfaction). The second section contains the components for implementing the program, including lesson plans for training the nondisabled partners, guidelines for the daily exercise sessions (i.e., a selection of exercise formats, activities for the sessions, suggestions for motivating participants, and program evaluation tools); a description of two exemplary exercise sessions; and a list of considerations to help plan program implementation. The final section contains appended materials, including: an aerobic conditioning unit, a handicapping conditions unit, the program instructional unit skills checklist, an assignment sheet, an activities packet, fitness evaluation forms, program evaluation consumer satisfaction survey, ideas for reinforcement selection, ideas for monitoring progress, teacher worksheets, and letters and forms. Several bibliographies provide additional references on fitness, fitness curriculum, handicapping conditions, sensitizing middle/high school students to disabilities, movies, and filmstrips. (DB)

Enhancing the Aerobic Fitness of Individuals with Moderate and Severe Disabilities:

A Peer-Mediated Aerobic Conditioning Program

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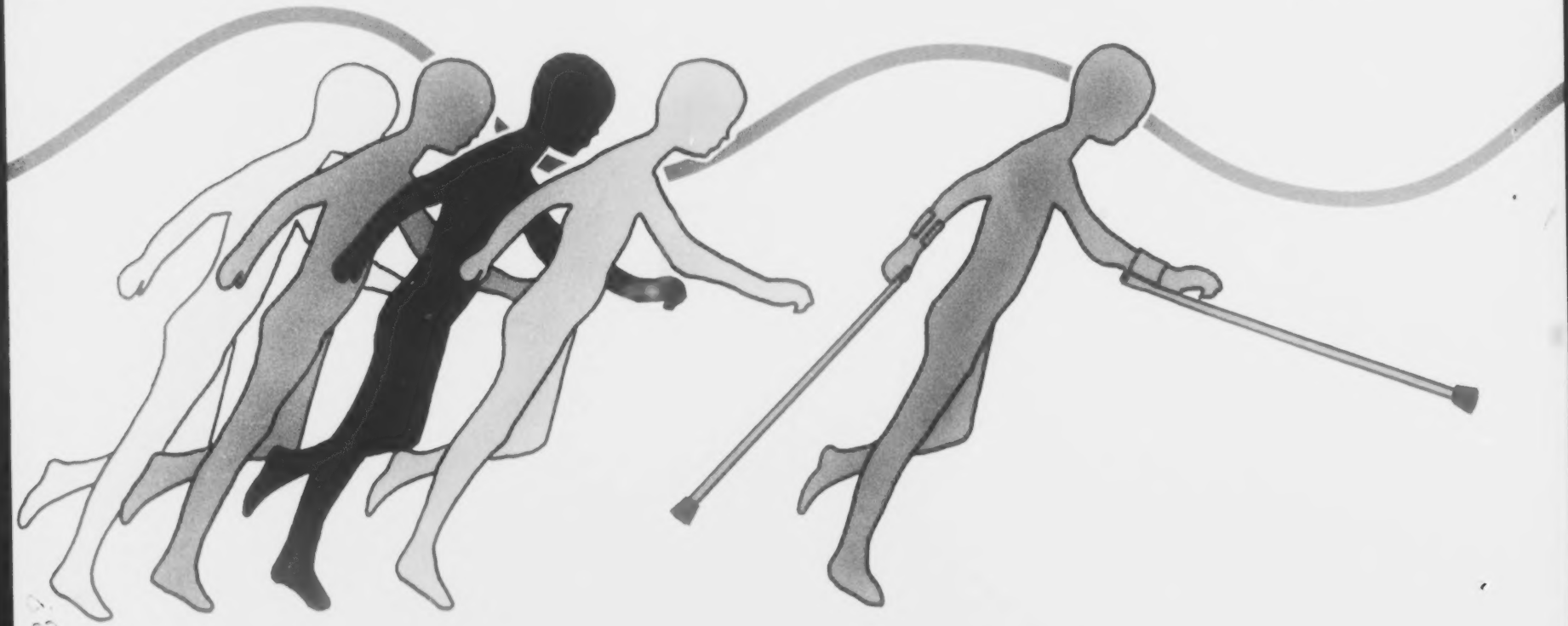

James Halle, Debra Gabler-Halle, Meredith McKee, Susan Bane, and Teresa Boyer

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James W. Halle, Project Director
Debra Gabler-Halle, Project Coordinator
Meredith McKee, Project Coordinator
Susan Bane, Project Assistant
Teresa Boyer, Project Assistant

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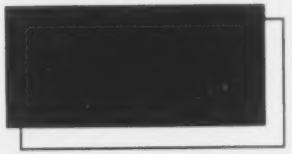
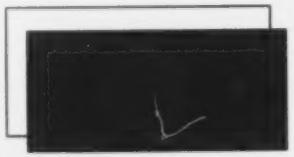


The information in this manual describes a newly-developed model of an integrated aerobic conditioning program. The Peer-mediated Aerobic Conditioning Program Model was developed with federal funds from the Office of Special Education and Rehabilitative Services, U.S. Department of Education to promote physical fitness for students with moderate and severe disabilities. Within the context of the physical fitness program, integration with nondisabled peers and the attitudes of nondisabled peers toward students with disabilities also were major foci of the model. The manual provides the empirical groundwork for the model's development and it details the implementation of the Peer-mediated Aerobic Conditioning Program (PACP). Information, materials, and suggestions for planning and implementing an integrated aerobic exercise program are presented.

The manual is divided into three sections. The first section contains all the "behind-the-scenes" work that went into the development of this model. It presents background information and the actual data collected from the major research areas of this project (i.e., fitness, social interaction, and consumer satisfaction.) The information in this section is not necessary for the actual implementation of the PACP, but rather provides the empirical groundwork for its development and support for its efficacy.

The second section contains the components for implementing the PACP; it is the "blood and guts" of the program. Information about implementation of the program is provided in the initial chapters. Chapter 3 includes the lesson plans used in training the nondisabled partners; Chapter 4 includes information on the implementation of the daily exercise sessions (i.e., a selection of exercise formats, activities for the sessions, suggestions for motivating the participants, and a variety of tools for evaluating the effectiveness of the program.) To provide a clear picture of how all the various aspects of the program work together, Chapter 5 describes two exemplary exercise sessions. This section ends with Chapter 6, a list of considerations that should help you plan for the implementation of the program in your school.

The third and final section contains all the materials described in earlier chapters of the manual. The materials have been designed with teachers' busy schedules in mind. In addition, a bibliography of related materials is included.



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Section 1
—Introduction—
Behind the Scenes

Chapter 1
Rationale and Program Description

Introduction

Before you delve into the information and materials for implementation of the Peer-mediated Aerobic Conditioning Program (PACP), we first want to provide you with the "behind-the-scenes" work that went into the development of this model program. To accomplish this, we have developed a rationale for teaching students with disabilities to engage in physical fitness activities, a brief description of the program, and a summary of the data collected from the major research areas of this project.

Rationale

We feel very strongly that physical fitness is as important for children or adults with disabilities as it is for their nondisabled peers. With a preponderance of literature suggesting the fitness level of learners with disabilities is lower than that of their nondisabled peers, their need for exercise is perhaps even greater. The reason for lower fitness levels is not well understood. It has been suggested that it may be due in part to delayed physical development or to fewer opportunities to participate in appropriate fitness programs. Whatever the reason, the maintenance of strength and stamina to permit participation in daily routines such as job and school performance; the reduction of body weight and fat to improve health status and appearance; and the reduction of high blood pressure, high cholesterol levels, and stress to prevent devastating illness

such as coronary heart disease are all important reasons for teaching learners with disabilities to engage in physical fitness activities. In addition, there is an abundance of research suggesting positive associations of exercise with various life-style variables (intellectual functioning, behavior, and self-concept) among children and adults with disabilities. A final reason for teaching fitness skills to individuals with disabilities is to facilitate integration. It has been suggested that integrative programming may be optimal in a physical education setting because ability differences are minimized. Moreover, the development of an age-appropriate leisure skill may provide opportunities for further interactions in normalized school and community settings.

Therefore, it would appear that an ideal context for integration may be activities that involve physical fitness, recreation, and leisure. It is with this in mind that the idea for our model demonstration grant was formulated. We thought the idea of nondisabled students serving as partners for their peers with disabilities in an aerobic conditioning program had merit. By including nondisabled peers in the program, the need for close supervision and individual encouragement would be addressed, and also the partnership could help promote interactions between the students with disabilities and their nondisabled peers.

We want to stress the fact that this program is *aerobic*. Aerobic means "in the presence of oxygen," and aerobic fitness is the body's ability to take in (requires efficient respiration), transport (requires an efficient and healthy heart, and network of blood vessels), and utilize (depends on the quality of blood and other specific cellular components) oxygen. The maximum amount of oxygen that can be transported from the lungs to the working cells is called the *maximal oxygen uptake ($\dot{V}O_2$ max)*. $\dot{V}O_2$max is considered the best single measure of overall fitness, because it reflects the condition of the cardiovascular and respiratory systems.

A simple conceptualization of working capacity will help to explain why $\dot{V}O_2$max is considered the standard measure of cardiovascular fitness. Every activity requires energy. The body uses food and oxygen to produce the energy it needs to perform its normal functions. The body stores food but it cannot store oxygen; therefore it is the amount of oxygen supplied to the working tissues that determines the amount of work that can be performed. If the respiratory muscles are strong, more oxygen can be brought in; if the muscles of the heart are efficient and the blood vessels pliable, more oxygen-carrying blood can be transported to the working tissues; and finally, if the muscles are toned, the cells can absorb and utilize blood and oxygen more efficiently.

$\dot{V}O_2$max is most accurately measured by a maximal graded exercise test in which a person performs on a treadmill or cycle ergometer, while heart rate and blood pressure are closely monitored. The expiratory air is collected during the performance and is analyzed for the amount of oxygen it contains. If there is a lot of oxygen in the expired

air, that means that the body is not as efficient as it could be in using the oxygen: the person may not be in very good shape. On the other hand, if there is not very much oxygen in the expired air, that means the body was efficient in using the oxygen—the person is probably in good shape. It is often not practical to measure $\dot{V}O_2$max directly. It demands relatively complicated laboratory equipment and maximal exertion of the person taking the test. However, submaximal tests are an alternative. The submaximal exercise test is based on the principle that the pulse rate increases linearly with increasing workloads. Consequently, the results from the submaximal performance can be projected to estimate the maximal oxygen consumption and heart rate.

In the literature of fitness programming, the term "physical fitness" has many different interpretations and meanings. Special education researchers, examining the effects of physical fitness training have focused primarily on the activities involving motor function (strength, flexibility, power, agility, balance). They have studied the differences in skill levels of students who are disabled and their nondisabled peers, and have designed programs to improve the fitness levels of the students with disabilities. Although motor function is an important component in any fitness program, the training effect produced by aerobic conditioning improves the heart, lungs, and blood vessels, making it the key measure to overall physical fitness.

Description

Now that our rationale for the program is clear, we will describe the program. In general, the PACP was designed to facilitate the participation in and maintenance of exercise for students with disabilities. The reasons for embarking on an exercise program, and the motivation that sustains the exercise may be very different for students with disabilities than it is for their nondisabled peers. Typically, nonhandicapped persons exercise for reasons that are more cognitively based (i.e., weight loss, improvement in their health status, and relaxation [fun]) and are not necessarily applicable to students with disabilities. The PACP model was developed to address this concern. In the PACP, group participation is a hallmark. Students with disabilities are paired with nondisabled peers during daily exercise sessions. This partnership serves a number of functions: (a) it provides the potential to enhance motivation for exercise; (b) it provides the capacity for monitoring exercise data (i.e., heart rates, laps, duration); and (c) it provides an opportunity for integration of students with and without disabilities.

The PACP is composed of two major components: a training curriculum for the nondisabled peers, to prepare them for their role in the program and the daily aerobic exercise sessions. The training curriculum consists of three units (i.e., defining aerobic fitness, describing handicapping conditions, and explaining how to implement the

PACP), which are delivered prior to the exercise sessions. The aerobic exercise sessions are conducted three times weekly for approximately 20 minutes each time, and typically include walking and jogging. Depending on the level of functioning of the participants, however, many variations in aerobic activity can be introduced.

Chapter 2
Empirical Bases

Introduction

On the following pages we will report the effects of the PACP on measures of fitness, integration, and consumer satisfaction during our three-year implementation of the model. We believe that you, as teachers and administrators, deserve evidence that this program is effective. Oftentimes, needed programs are adopted based solely on intuition or word-of-mouth reports from colleagues. The data on the following pages are presented to give you a better understanding of the program, and to demonstrate why we feel confident that the PACP Model is effective.

This section begins with a description of the participants. It is important to carefully identify their functioning levels and ages, so that as consumers of the program, you will know its generality and its limitations (i.e., for whom it is likely to be successful and for whom it is not). Following this description, there will be a brief explanation of the research design. Finally, we will report the effects of the PACP on measures of fitness, integration, and consumer satisfaction. An abundance of data have been collected over the three-year duration of this project, and reporting it all is beyond the scope of this manual. Instead, we have limited our discussion to a detailed description of the results from Year 1. Results from Years 2 and 3 will be summarized briefly.

Participants

In the three years that the model was under development, we introduced the PACP in four different school settings with a wide variety of participants in terms of functioning levels and ages. The chart below summarizes pertinent information about the students

with and without disabilities who participated in the PACP. It is important to note that all of the students with disabilities were ambulatory.

Year	Group		Number and Sex	Age	Diagnoses	Nondisabled Peers
1	1	integrated elementary school	7 participants 4 girls 3 boys	6-13 years $\bar{x}$ = 9	developmental delay seizures, microcephalus, cerebral palsy, CNS disorder, severe mental retardation	11 fifth and sixth grade students 6 girls 5 boys
	2	integrated elementary school	7 participants 3 girls 4 boys	9-12 years $\bar{x}$ = 10.2 years	Down's syndrome, seizures, language delayed, hydrocephalus, microcephalus, cerebral palsy, hyperactivity, mental retardation	14 fifth grade students 7 girls 7 boys
2	1	integrated elementary school (same as year 1)*	6 participants 3 girls 3 boys	9-19 years $\bar{x}$ = 13.6	developmental delay, seizures, microcephalus, cerebral palsy, CNS disorder, hydrocephalus, severe mental retardation	14 fifth grade students 9 girls 5 boys
	2	segregated K-12 school*	3 participants 2 girls 1 boy	9-17 years $\bar{x}$ = 12.7 years	seizures, obesity, asthmatic, trainable mentally handicapped	17 high school students 9 girls 8 boys
3	1	integrated high school	4 participants 1 girl 3 boys	15-20 years $\bar{x}$ = 17.2 years	Down's syndrome, cerebral palsy, moderate mental retardation, Mean full scale IQ = 45	8 high school students
	2	segregated K-12 school (same as Year 2)	4 participants 1 girl 3 boys	18-20 years $\bar{x}$ = 19.5 years	Down's syndrome, seizures	8 high school students

*Participants for Group 1 and Group 2 were drawn from each setting.

Research Design

A Note About Designs

Experimental designs are often misunderstood. In many cases they can be quite simple and direct. Their purpose is to ensure that when you implement an instructional program (also referred to as an intervention or treatment) that any changes produced are, in fact, attributable to your program and not to other factors. To provide a convincing demonstration, it is beneficial to introduce the program at particular times and withhold it at other times. In a typical group design, one group of learners receives the program (i.e., the experimental group) and another group does not (i.e., the control group). In other words, treatment is withheld from the control group. By comparing changes in performance from before treatment (i.e., pretest) to after treatment (i.e., posttest) for each group, you obtain information on the effect of treatment versus no-treatment.

Factors that complicate the implementation of group designs are random assignment to groups and sufficiency of group size. We overcame these concerns by superimposing another type of design, a multiple baseline, within a traditional group design. In the multiple-baseline design, treatment is introduced in a staggered sequence to more than one group. The rationale for its use is that if the performance of each group changes when, and only when, treatment is introduced, then factors other than your treatment can be ruled out as explanatory for the change. In this design, control groups do not remain as no-treatment controls: once changes in perfomance occur for the group receiving treatment, it is introduced to the control group. This is the design described below.

Experimental designs are crucial for demonstrating the effectiveness of an instructional program or intervention. Without them, it is difficult, if not impossible, to know that the effects or outcomes are caused by your program. Some examples of other factors that may influence learners' performance and thus provide rival explanations for outcomes include (a) events that occur at the same time that treatment is introduced (e.g., family crisis, teacher change, power outage) and (b) changes that occur over time within the learner (e.g., growing stronger, healthier, smarter, or becoming tired, bored, or ill). Experimental designs allow an interventionist to rule out these explantions for the results.

Fitness

An experimental/control group design (without random assignment) was used to evaluate the effect of the aerobic conditioning program on the predetermined physiological measures of fitness. A multiple-baseline design across groups of students (Kazdin, 1982) was nested within this more traditional experimental format. Once the control group had completed its control function (i.e., assessing changes with a group who did not receive exercise), it became a second experimental group that allowed us to replicate the effect of the aerobic conditioning program.

Both groups of students with disabilities were administered three fitness evaluations, including a measure of weight, a determination of percentage of body fat, and a graded exercise test at the university physical fitness laboratory. The preliminary fitness evaluation was performed prior to any involvement in the aerobic exercise program and served as a baseline measure of each student's cardiorespiratory fitness level and health status.

All the participants returned to the laboratory for a second fitness evaluation after Group 1 had exercised for six weeks and before initiating the exercise program with Group 2. Thus, the second evaluation served as an indicator of change in aerobic fitness for Group 1 and as a second baseline measure for Group 2. This allowed an assessment of change scores for a group that received the exercise and for a group that did not. Seven weeks later, all participants underwent a third fitness evaluation. The third evaluation served as an indicator of change in fitness for both groups. Table 1 summarizes the testing schedule for Groups 1 and 2.

Table 1
Fitness evaluation schedule for Groups 1 and 2

	Evaluation 1	Evaluation 2	Evaluation 3
Group 1	Baseline	After 6 weeks of exercise	After 13 weeks of exercise
Group 2	Baseline	Baseline	After 7 weeks of exercise

Measurement protocols

Measurements of percentage of body fat were determined using skinfold calipers. Measurements were taken three times using a large caliper, at two sites: the triceps (back of the upper arm) and subscapular (mid-back). The averaged value of the three measurements was used to determine percentage of body fat as defined by Boileau, Lohman, and Slaughter (1985).

A submaximal graded exercise test on a motorized treadmill was used to determine changes in aerobic fitness. The treadmill protocols were individualized to accommodate the large variation in motor abilities of the participants. Prior to the initiation of the first test, the treadmill speed was adjusted to a comfortable walking pace (1.75 to 3.50 mph) for each student. The speed was then held constant throughout the test until higher workloads were accomplished. Workload was incremented in two-minute intervals

starting at zero percent grade and increasing two percent at each interval. Three variables determined workload: speed of the treadmill, grade or incline of the treadmill, and time on the treadmill. As time of the test progressed, the task or workload became more physically demanding. Heart rate was monitored continuously throughout the test by a Sporttester PE3000 heart rate meter, and recorded at the end of each minute of the test. The exercise test was terminated when 60 to 80 percent of the student's estimated maximum heart rate (see Karvonen, 1959) was achieved, or when the student voluntarily terminated the test. For each participant, the testing protocol remained the same for each of the three fitness evaluations.

Integration

In Year 1, integration measures were gathered within the framework of the experimental design described above. We continuously monitored social interaction between participants with and without disabilities, with an observational system that included a definition of social interaction, a recording form, and a recording procedure for making systematic observations. The definition included categories such as touch, gesturing, nonspeech sounds, and speech. Also recorded were the tone (positive or negative) of the interaction, and whether it was an initiation or a response. We observed only students with disabilities, one at a time, for five minutes per recording, and conducted multiple recordings per student per week.

These measures were gathered in two settings. Data were collected in the context of the PACP exercise sessions to demonstrate that interaction occurred at high rates during the program itself. In addition, a second setting was selected carefully. Our reason for gathering data in this setting was to determine if increased interaction would "spillover" from the exercise sessions to another time of day, when all participants were together, but no demands were made (explicitly or implicitly) with regard to their interaction. We felt the most important question was not whether interaction would occur when we created a situation and instructed students how to interact, but whether it would occur when there were no demands operating (i.e., students chose to be with one another).

Consumer Satisfaction

Consumer satisfaction refers to a method of evaluating or validating a program. Every program is designed to help someone with a problem or to improve one's quality of life. Program developers may have their own opinions about the contribution of the program and they may gather objective measures that assess the success of the

program, but the consumer should be asked to evaluate the program and its effects. Certainly in voluntary programs, consumers register their satisfaction regardless of the formalized opportunity to directly indicate their feelings by dropping out or by not re-enrolling in the program. Wolf (1978) discussed consumer satisfaction in relation to three aspects of programming: **goals**, **procedures**, and **outcomes**. Consumers may be invited to comment on any one or all three of these aspects.

Consumer satisfaction measures were not gathered within the framework of the design described. To assess the impact of the program on the students with and without disabilities, a consumer satisfaction survey was administered to the nondisabled peers, parents, school personnel, and project staff. In Year 1, these different consumer groups were asked to rate the participants "enjoyment" of the exercise program. The evaluation was conducted in two parts: **Ongoing Satisfaction** was measured immediately following three daily exercise sessions, and **End-of-Program Satisfaction** data were gathered one week after the completion of the program.

The surveys were individualized for each target consumer group. The format included a number of questions, each one followed by a 4-point Likert scale or a "yes/no" choice and a space for comments. As a partial assessment of reliability, relevant consumer groups (e.g., nondisabled peers, teachers, parents, and project staff) were asked to respond to similar questions regarding enjoyment of the exercise session for students with and without disabilities (See Table 3 for a list of similar questions asked of varying consumer groups).

To assess the enjoyment of the students with disabilities, a number of questions that measured enjoyment indirectly (see Table 3, Satisfaction of Students with Disabilities) were posed to relevant consumer groups. Students with disabilities also were interviewed directly to determine their satisfaction with the program; however, because of their intellectual and communicative limitations, only six students (of the 12 participating) were included in the assessment. Nondisabled peers' enjoyment of the exercise program was assessed by posing questions directly to them and by asking other relevant consumer groups to rate their enjoyment (see Table 3, Satisfaction of Nondisabled Peers).

Results

Fitness

The results of the fitness evaluations for Years 1, 2, and 3 are detailed below. Again, we are providing you with this information so that you may evaluate the program yourself. Through this evaluation procedure, you will discover the effect of the PACP on weight, body fat, and heart rate for the children and youth who participated.

Table 2
Changes in percent body fat and weight from test 1 to test 3 for groups 1 and 2.

		Year 1	Year 2	Year 3
PERCENT BODY FAT				
	GROUP 1	Decreased from 21.4 ± 3.0 to 20.9 ± 3.9	Increased from 30.6 to 30.9	Calculations for percent body fat were not made due to errors
	GROUP 2	Increased for 19.3 ± 3.0 to 19.6 ± 3.1	Decreased from 29.1 to 28.5	
WEIGHT				
	GROUP 1	Increased form 29.0 ± 4.6 to 30.3 ± 5.0	Increased from 61.4 to 62.3	Decreased from 56.3 to 54.3
	GROUP 2	Increased from 34.0 ± 3.6 to 34.8 ± 3.4	Increased from 35.2 to 36.7	Decreased from 53.1 to 51.8

Weight and Percentage of Body Fat

The test of significant differences across fitness administrations for weight and percentage of body fat ($\bar{x} \pm SE$) was determined with a one-tailed paired t test. For both groups, we expected percentage of body fat to decrease from the baseline measure (Time 1) to the posttest (Time 3); weight could increase due to growth and greater muscle mass, could remain stable, or could decrease due to fat loss. In Year 1, for Group 1, the hypothesized changes were realized (i.e., percentage of body fat decreased from 21.4 ± 3.7 to 20.9 ± 3.9, and weight increased from 29.0 ± 4.6 to 30.3 ± 5.0); however, the changes did not meet statistical significance. For Group 2, the hypothesized changes were not realized (i.e., percentage of body fat increased from 19.3 ± 3.0 to 19.6 ± 3.1, and weight increased from 34.0 ± 3.6 to 34.8 ± 3.4). Although the change was not significant, it was in the wrong direction. Results from years 1, 2, 3 are summarized in Table 2.

Heart rate responses

Figures 1 and 2 on the following pages summarize the individual heart rate responses of participants in Groups 1 and 2 across Tests 1, 2, and 3 for Year 1. Heart rates appear on the vertical axis and workload appears on the horizontal axis.

For all six students in Group 1, heart rate values improved from Test 1 (pretest) to Test 3 (13 weeks of exercise). It should be noted, however, that for JS, the marked differences in heart rate values from Test 1 to Test 3 were observed only at lower workloads; at higher levels, the difference was not detectable. For four of the six students in Group 2 (see Figure 2), heart rate values improved from Test 1 (pretest) to Test 3 (seven weeks of exercise); for the remaining two students (MN and HT), heart rate values showed no improvement.

To summarize briefly, when individual students' data are analyzed visually, 10 of the 12 participants demonstrate improvement from Test 1 to Test 3. Two students (and perhaps a third) do not appear to improve.

Another way to analyze the heart rate data produced by treadmill testing is to collapse the data across students within a group to assess group effects. We did this by summing the heart rate values for all six students within a group minute-by-minute, and then dividing by six to obtain an average heart rate for the group for each minute on the treadmill. We limited this analysis to the first six minutes on the treadmill, because some students remained on the treadmill for only six minutes on one or more tests.

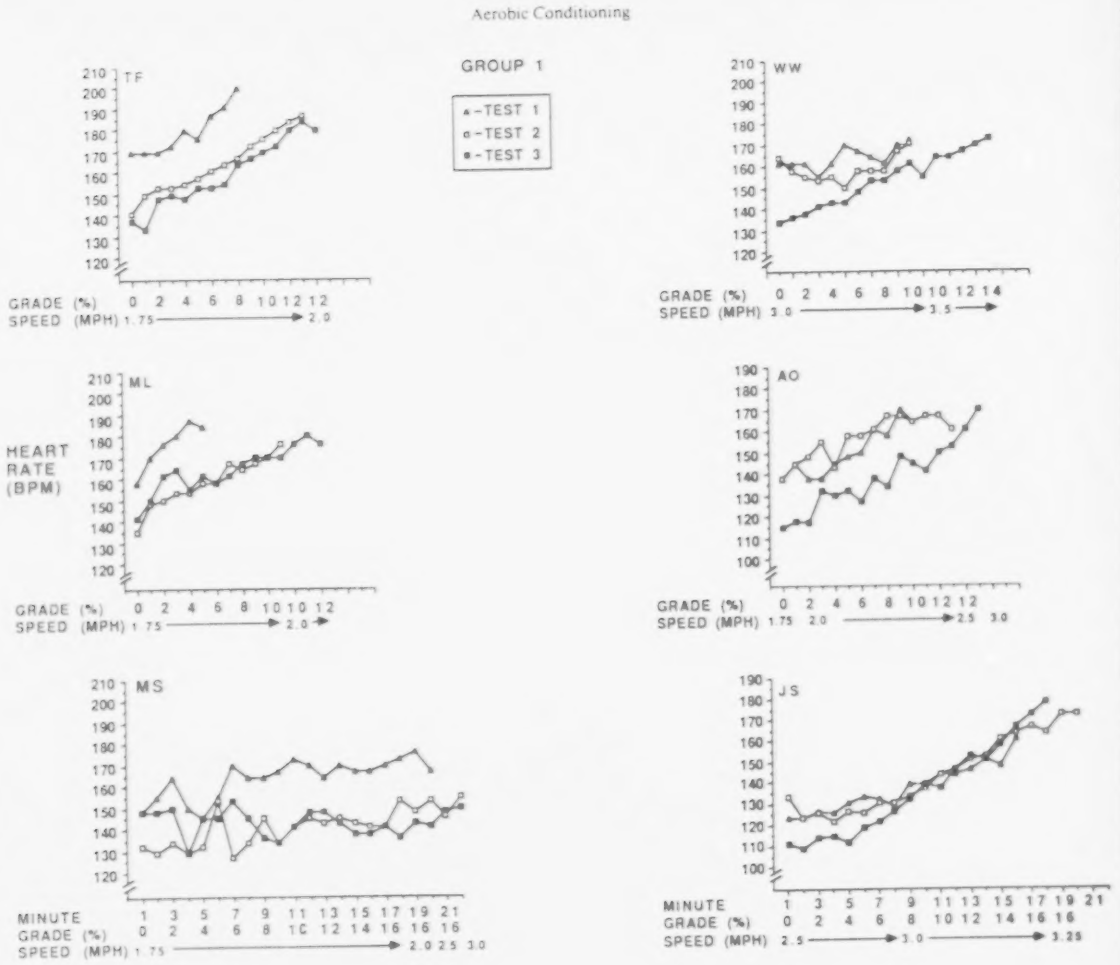


Figure 1. Individual exercise heart rate values for Tests 1, 2, and 3 for Group 1. Indicated on the abscissa are individual testing protocols (minutes on the treadmill, percentage of grade, and speed [mph]). Each of these variables contributed to overall workload.

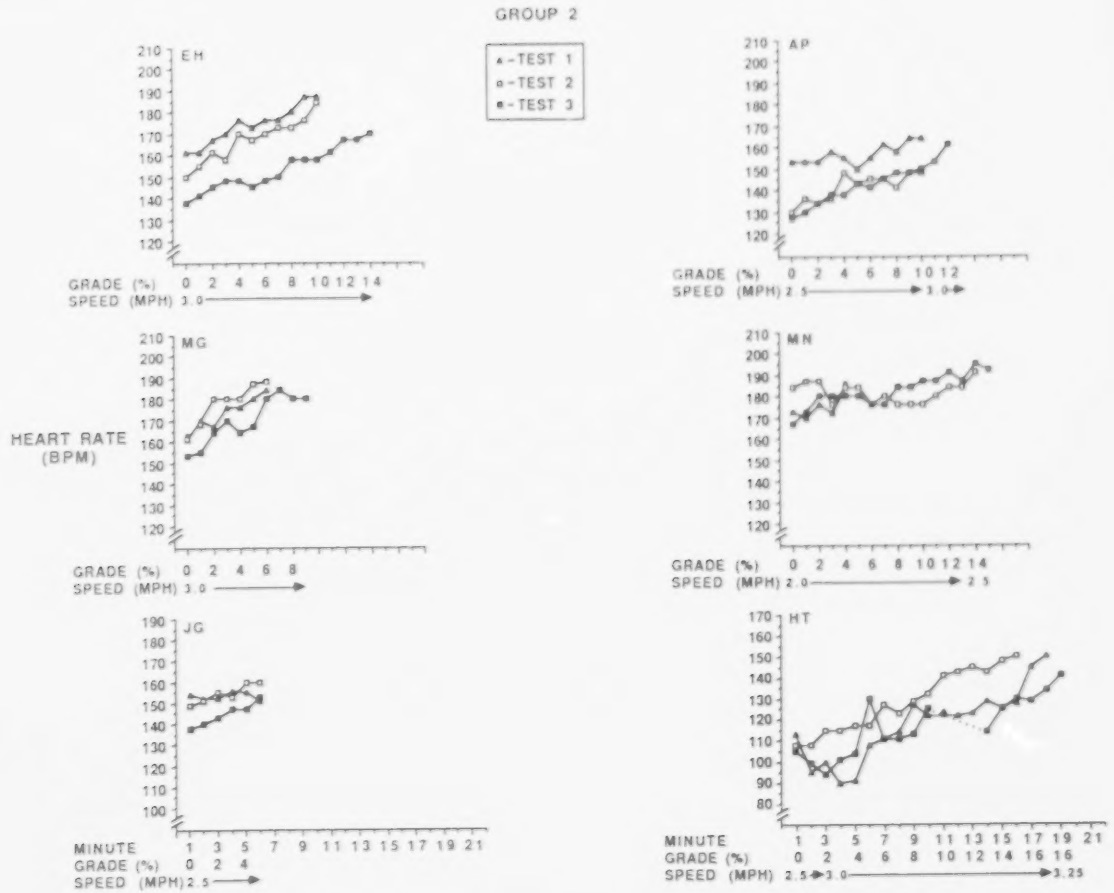


Figure 2. Individual exercise heart rate values for Tests 1, 2, and 3 for Group 2. Indicated on the abscissa are individual testing protocols (minutes on the treadmill, percentage of grade, and speed [mph]).

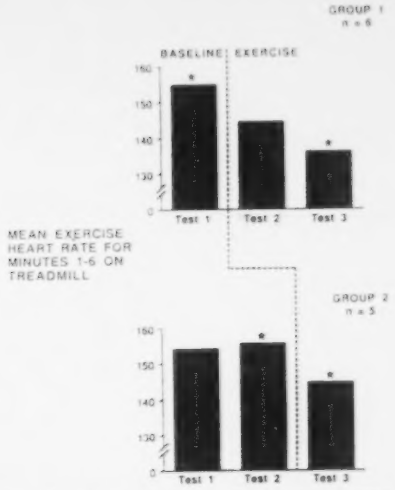


Figure 3. Change in mean exercise heart rate values for minutes 1 to 6 during Tests 1, 2, and 3 for Groups 1 and 2. * denotes significance ($p<.05$ one-tailed paired *t* test) between tests.

Figure 4

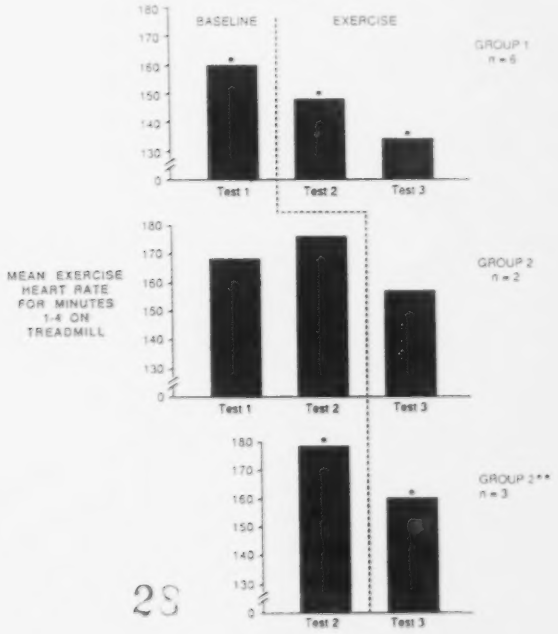


Figure 3 reveals the average exercise heart rates for minutes 1-6 on the treadmill for each group on each of the three tests. The dashed line indicates when exercise was introduced for each group. It is clear that mean exercise heart rates changed for each group only after the PACP was introduced to that group. After six weeks of exercise, Group 1 evidenced a substantial decrease from 154.8 bpm to 144.5 bpm. This change approached statistical significance. After 13 weeks of exercise, a significant decrease (from 154.8 bpm to 136.1 bpm) was observed, as indicated by the asterisks above Tests 1 and 3.

Prior to beginning the PACP, Group 2 showed a nonsignificant increase in exercise heart rate from Test 1 (154.2 bpm) to Test 2 (155.6 bpm). Remember both of these evaluations were pretests, because Group 2 was serving as a control during this time period. From Test 2 (the second pretest) to Test 3, a significant decrease was observed, as indicated by the asterisks above these two tests. The average heart rate value for the group was reduced from 155.6 bpm to 144.7 bpm.

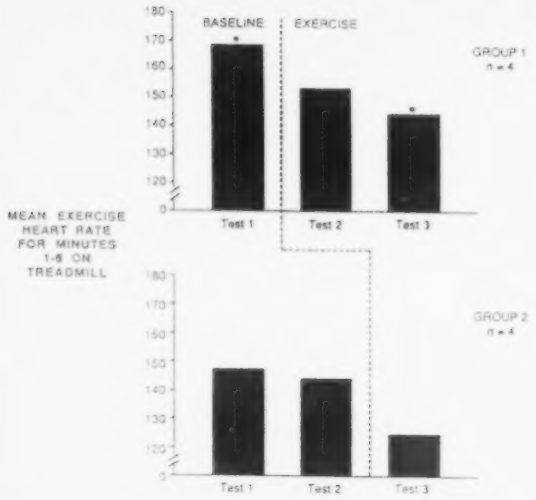
Years 2 and 3

Figures 4 and 5 reveal that the group data in Years 2 and 3 of the project produced similar results. That is, fitness levels of students with moderate and severe intellectual disabilities improved only when the PACP was introduced. It is clear from these findings that the effectiveness of the PACP was consistent for participants across a wide range of disabilities and ages. Although the results in terms of physical fitness were very positive in general, some qualifications are needed to understand shortcomings or limitations, as well as the strengths, of the PACP.

In Year 1 of the project, we observed vast differences among students in the amount of improvement accruing from participation in the PACP. We believe a major factor causing these differences was our inability to monitor heart rates during the daily exercise sessions. We had hoped to obtain this measure by conducting pulse checks (radial artery in the wrist), but found that we could not obtain accurate readings because students had difficulty remaining still during the check. Because we could not measure exercise heart rates during the sessions, we were not able to individualize the intensity of the workouts for each participant. Such individualization is realized by determining a heart-rate target zone for each student (refer to Chapter 4: Evaluation-Fitness) and then maintaining heart rates in that zone for that student.

As a result of our failure to individualize exercise intensity, all of the participants exercised at very similar levels. This meant that some students, including those in very poor condition when the PACP began, were having to push themselves to keep up, while

Figure 5



others—those who were in good physical condition, easily maintained the ongoing exercise intensity level. These conditions produced mixed results in terms of individual fitness gains. Those students who were least fit substantially improved their levels of fitness; those already in good shape demonstrated little change.

Lack of individualization was remedied in Years 2 and 3 with the purchase of a heart rate meter, (Sporttester PE 3000) which allowed us to monitor minute-by-minute exercise heart rates during the daily exercise sessions. These meters contained auditory signals that could be set at the two end points of the target zone, such that one signal would be triggered if the heart rate fell below the base rate, and the other signal would sound if the heart rate exceeded the top rate. Nondisabled peers became sensitive to these signals, and used them to structure the level of their encouragement. Of the 17 students for whom we gathered fitness data, (tested on the treadmill) in Years 2 and 3, only two showed little or no improvement.

We are not suggesting that every reader who decides to adopt the PACP needs to purchase a heart rate monitor, although we do believe it is a good and reasonable investment. Such a purchase is *not* indicated if accurate exercise pulse rates can be obtained, or if improvements in cardiovascular fitness are a secondary concern, subordinate to social and recreational objectives that may be met by participation in an integrated recreation program.

Another criticism that might be leveled at the PACP is insufficiency of the number of students who have participated. Over the three years of the project, more than 50 students with moderate and severe disabilities have been included in the PACP. We have gathered objective measures of fitness for 29 of these participants. Furthermore, more than 70 nondisabled students have participated as partners or peer-mediators in the PACP. Although the numbers are not extremely large, the empirical basis for the program is compelling for a sufficient number of students to warrant serious consideration.

Perhaps the most important consideration in making a decision about adoption of the PACP is a thorough understanding for whom it was effective and for whom it was not. Previously, we discussed one limitation that had been remedied: a student's entering fitness level. Until we individualized according to heart rate, those in poor condition benefitted more than those in good condition. We have not had as much success with another concern: students who are either noncompliant or whose level of motivation to exercise creates difficulty in maintaining the required intensity. These two problems are not unrelated. That is, low levels of motivation may produce noncompliance. The two are mentioned separately, because in some instances it appeared that motivation wasn't an issue; rather the student was noncompliant representing a problem in behavior management.

Our response to the problems of motivation and noncompliance was to enhance the reinforcing value (the enjoyment) of the exercise sessions. The same factors that may be effective at maintaining participation in exercise with nondisabled individuals (e.g., losing weight to improve appearance, stress reduction, decreased risk of cardiovascular disease) probably are not operating for those with more severe intellectual disabilities. Thus, we attempted to capitalize on social incentives, by including nondisabled peers as partners, and by identifying individualized reinforcers that could be dispensed contingent on achieving pre-established goals during a session. Please refer to Chapter 4 for a more detailed description of motivational strategies.

In the most difficult cases, we temporarily abandoned our objective of *aerobic* training and focused instead on reinforcing longer periods of participation in exercise at very mild intensities. Our hope was to encourage compliance and participation by allowing these students to exercise at a level that was comfortable for them, and then to gradually increase the intensity of the exercise until it was within the aerobic range. Even with all of our efforts, we had a great deal of difficulty with four or five participants. Interestingly, the PACP appeared effective in demonstrating aerobic conditioning effects.

Integration

The effect of the PACP on the amount of interaction between participants with and without disabilities is presented below. Remember, the most important question was not whether interaction would occur when we created a situation and instructed students how to interact, but whether it would occur when there were no demands operating.

In Year 1, we found that the amount of interaction between the participants with and without disabilities during the exercise sessions was consistently high. In the setting comprised of children with more severe disabilities, the levels of interaction varied from about 80 percent to 100 percent of the time we recorded. In the setting comprised of children with more moderate disabilities, the levels varied from 50 percent to 90 percent of the time. It is noteworthy that the frequency of interaction was less with those whose disabilities were less severe, and that a decreasing trend characterized the data for this group: that is, over the seven weeks of exercise for this group, the amount of interaction continued to decrease.

In Year 1, social interaction data were gathered in the cafeteria at lunch time to assess the interaction "spillover" from the exercise sessions. This was the only setting available in either school where the PACP participants were together. The results reveal that the level of interaction between the program participants with and without disabilities

Figure 6

Group 1

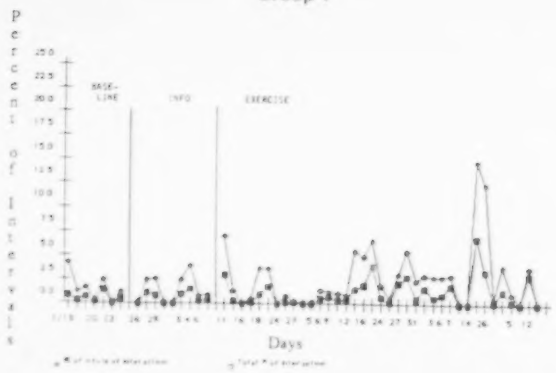
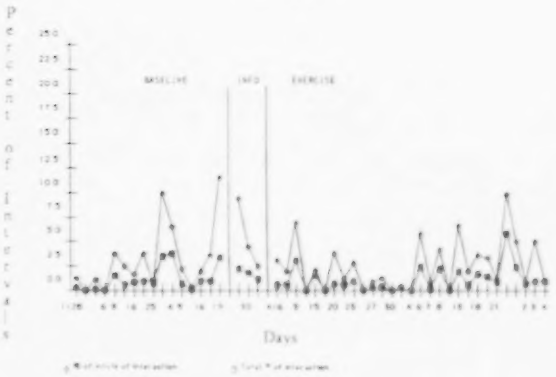


Figure 7

Group 2



was very low and was unaffected by the PACP (i.e., no systematic change was noted as a result of participation in the PACP). To more fully understand the enormity of the interactional deficit, we gathered data in the cafeteria on interaction between randomly-selected nondisabled students. The results of this control procedure are noted by the horizontal lines on Figures 6 and 7. We were somewhat surprised by the lack of effects on attitudes and social interaction reflected in our data. Our project staff believed (from what they had observed) that some change had occurred. Furthermore, comments by teachers on the Consumer Satisfaction Surveys (see below) hinted that they too had noted changes. Because of this gap between what was observed objectively and what was "noticed" subjectively, we pinpointed limitations (i.e., poor setting and data-collection procedures) in our methods and attempted to remedy these problems in Years 2 and 3.

As a result of these limitations, in Years 2 and 3 we decided to use the time immediately before and after the formal exercise sessions as the period to assess "spillover." In large part, this was done because the time when the participants were integrated was so restricted.

Another procedure for collecting data was added to our arsenal because we thought that we might have missed a number of interactions that were "fleeting" or brief. Remember, we had gathered data on each participant with disabilities during five-minute samples. Even if we had three observers recording, any interaction occurring by the remaining four participants would be missed. Thus, we adopted PLA-CHECK recording, which consisted of scanning the setting for all participants present within 10-second intervals and deciding whether each was interacting or not. Thirty such determinations were made for each 5-minute observation so that all participants were observed every 10 seconds. A summary statement and specific data for Years 2 and 3 are presented below.

Year 2:

Summary: Due to the low rate of interaction during Year 1, we added a quantitative measure borrowing heavily from PLA-CHECK (Cataldo and Risley, 1974). Therefore, in Year 2 individual and group measures of SI were collected. Generally, the results were similar to those reported in Year 1; that is, participation in the PACP had little or no effect on interaction.

Results: Group Analyses (PLA-CHECK)

Setting	Group 1	Group 2
PACP	61-100%($\bar{x}$=77%) R = 80-100% ($\bar{x}$=95%)	0-55% R = 0-100% ($\bar{x}$=50%)
Generalization: Nonstructured time prior to and following the exercise sessions. Recess period (Group 1 only)	5-100% ($\bar{x}$=41%) R = 56-100% ($\bar{x}$=89%)	4-55% ($\bar{x}$=22%) R = 27-100% ($\bar{x}$=63%)

Individual Analyses (T=touch, MG=motor gestural, V=vocal/verbal, and PO=position and orientation)

Setting	Group1	Group 2
PACP	0-100% ($\bar{x}$=81%) R = 95-100% ($\bar{x}$=99%) T = 43% V = 16% MG = 40% PO = 2%	0-100% ($\bar{x}$=54%) R = 75% T = 37% V = 19% MG = 20% PO = 24%
Generalization: Nonstructured time prior to and following the exercise sessions. Recess period (Group 1 only)	0-100% ($\bar{x}$=11%) R = 57-100% ($\bar{x}$=66%) T = 33% V =26% MG =35% PO = 65%	Not done

Year 3:

Summary: The low rate of interaction during Years 1 and 2 continued to surprise us. On an intuitive level we felt the quality of interaction was improving. In addition, teacher responses on the Consumer Satisfaction Surveys hinted that they noticed changes as well. Based on these assumptions, we modified our code during Year 3 and continued to measure SI in the PACP and in the generalization setting. In addition, two interventions were developed and implemented. One intervention involved manipulation of teacher presence and the other manipulated the amount and type of information provided to the students with disabilities.

Results showed that participation in the PACP had little to no effect on social interaction. Results of the mini-investigations were equivocal; teacher proximity had little effect on interaction and peer knowledge may increase peer interaction.

Results: Group Analyses (PLA-CHECK)

Setting	Group 1		Group 2	
Generalization: *Note: the percent of interval data was converted to rate of interaction/ minute	Classroom, hallways between classroom and gym, and the gym prior to and following sessions		Nonstructured time prior to and following the exercise session	
	Target	Nondisabled	Target	Nondisabled
Baseline	1.05*	1.75%	10%	5%
Intervention	1.35*	8%	8%	10%

Consumer Satisfaction

Table 3 summarizes the ratings of enjoyment by all consumer groups for the students with disabilities and their nondisabled peers in Year 1. Descriptive statistics and visual inspection were used to analyze the data. Responses to each question were summed and a mean was reported for each question. Yes/no questions were scored by assigning a value of 2 to "yes" and 1 to "no" responses.

Satisfaction of Students with Disabilities

Nondisabled peers, teachers, and project staff rated the enjoyment of the program for the students with disabilities on a scale of 1 (low) to 4 (high) after three daily exercise sessions that occurred in the last month of the program (Ongoing Satisfaction). The combined average rating of these questions was 2.7. The teachers' ratings of whether or not their students appeared to have enjoyed the program upon returning to class (a yes/no question) was 1.7 (Group 1, 1.6; Group 2, 1.8). The students with disabilities (Group 2 only) also were asked following the same sessions if they had fun and liked the program. Of the six students with disabilities that responded to the survey, four consistently responded yes; a group mean of 1.9 was recorded. To assess the reliability or agreement of responses, a comparison of similar questions across consumer groups

revealed that three of the four possible comparisons associated with the Ongoing Assessment were within 0.2 of a point of one another. The End-of-Program Satisfaction combined rating for students with disabilities was 3.3 (Group 1, 3.0; Group 2, 3.7); however, the reliability was poor, perhaps due to the reliance of a single point of comparison between teachers and parents of participants with disabilities.

Satisfaction of Nonhandicapped Peers

The results of the Ongoing Satisfaction of the nonhandicapped peers are also presented in Table 3. The combined average rating to the responses from the nonhandicapped peers, their teachers, and the project staff was 3.5 (Group 1, 3.5; Group 2, 3.5). When the nonhandicapped peers were asked how much they enjoyed the exercise sessions, the combined average rating was 3.3 (Group 1, 3.3; Group 2, 3.3). When queried about a choice of working with a peer who had a disability or doing a program management task, they reported they would prefer to work with a peer (combined 3.3; Group 1, 3.1; Group 2, 3.4). The End-of-Program Assessment was completed by the teachers of the nonhandicapped peers (Groups 1 and 2), and the nonhandicapped peers in Group 1 only. (The results from the nonhandicapped peers in Group 2 were not collected due to end of the year schedule conflicts.) The teachers' combined rating of how much they thought their students "enjoyed" the program was 3.5 (Group 1, 4.0; Group 2, 3.0). All nine nonhandicapped peers who responded reported a high level of enjoyment (4.0) in working with the students with disabilities and none of them would have dropped out of the fitness program while it was ongoing. When asked whether or not they would like to be involved again the following year, eight of nine responded yes.

Years 2 and 3

As in Year 1, consumer satisfaction surveys were administered twice during Years 2 and 3. The first administration, however, was shifted in time so that it was completed toward the beginning of the program; as before, the second was completed at the program's conclusion. The purpose of the shift in time was to obtain feedback that we could use immediately to make changes to enhance consumers' satisfaction while the program was ongoing.

Two additional changes were implemented in Years 2 and 3. First, items were organized according to *goals*, *procedures*, and *outcomes*. The first dimension, *goals*, addressed the need for students to be physically fit and to be educated in integrated settings as well as the need for school time to be allotted to these goals. The next

Table 3
Ongoing and End-of-Program Consumer Satisfaction Surveys: Within Group and Across Group Means

	Consumer groups					
	Students with disabilities (N=6)	Nondisabled peers (N=25)	Teachers of students with disabilities (N=7)	Teachers of nondisabled peers (N=2)	Project staff (N=3)	Parents of students with disabilities (N=9)
Ongoing Satisfaction Survey						
Satisfaction of students with disabilities						
1. Nonhandicapped peers: When you arrived at your partner's classroom, did she/he want to come with you? (no, not at all; yes, very much)[a]		3.2[b] (3.4; 2.9)[c]				
Teachers of students with disabilities: How willingly did ____ go with his/her nonhandicapped peer or project staff when she/he came to the classroom? (totally unwillingly; very willingly)			3.0 (3.3; 2.7)			
2. When the exercise program started, how much did ____ want to begin exercising? (none; a lot)		2.4 (2.6; 2.2)			2.4 (2.5; 2.2)	
3. How much did you have to push/pull your partner through the hall to get him/her to the exercise program? (a lot; none)		3.2 (3.0; 3.3)				
4. Nonhandicapped peers: During the exercise program, how much did you have to push/pull your partner to keep him/her from sitting down or running away? (a lot; none)		2.4 (2.1; 2.6)				
Project staff: During the exercise program, how much did ____ have to be pushed/pulled to keep him/her from sitting or running away? (a lot; none)					2.6 (2.5; 2.6)	
5. When the exercise session ended today, how much did ____ want to leave? (a lot; not at all)		2.0 (2.3; 1.7)			3.0 (2.4; 3.6)	
6. Upon ____'s return to the classroom after the fitness program, did she/he appear to have enjoyed the program? (yes; no)			1.7[d] (1.6; 1.8)[e]			
7. Did you have fun today? (yes; no)	1.9[f] (Group 2 only)					
8. Did you like this program today? (yes; no)	1.8[f] (Group 2 only)					
Satisfaction of nonhandicapped peers						
1. Did you have to encourage students to attend the exercise session today? (a lot; none)				4.0 (4.0; 4.0)		

(Table 3 continued)

	Consumer groups					
	Students with disabilities (N=6)	Nondisabled peers (N=25)	Teachers of students with disabilities (N=7)	Teachers of nondisabled peers (N=2)	Project staff (N=3)	Parents of students with disabilities (N=9)
2. How many students asked to be excused from today's exercise program? (a lot; none)				4.0 (4.0; 4.0)		
3. When it was time for the students (nonhandicapped peers) to leave for today's program, how quickly did they finish what they were doing so they could get to the program? (dawdled; very quickly)				3.5 (4.0; 3.0)		
4. How much did you enjoy the exercise program today? (not at all; a lot)		3.3 (3.3; 3.3)				
5. How much are you looking forward to the next exercise session? (not at all; a lot)		3.3 (3.4; 3.2)				
6. If you had a choice to work with a partner (partners=students with disabilities) *or* help the program staff do something like count laps, how much would you like to work with a partner? (not at all; a lot)		3.3 (3.1; 3.4)				
7. Are you looking forward to the end of the program? (a lot; not at all)		3.5 (3.5; 3.4)				
8. From your observations today, what percent of the nonhandicapped peers were positively involved in the program? (0%, 100%)		3.4 (3.0; 3.8)				
End-of-Program Satisfaction Survey						
Satisfaction of students with disabilities						
1. How much do you think ____ has enjoyed participating in the program? (not at all; a lot)			3.3 (2.6; 4.0)			3.3 (3.3; 3.3)
Satisfaction of nonhandicapped peers						
1. How much do you think your students enjoyed the program? (none; a lot)				3.5 (4.0; 3.0)		
2. Overall, how much did you enjoy working with students with disabilities? (not at all; a lot)		4.0 (Group 1 only)				
3. If you could have dropped out of the fitness program while it was going on, would you have? (yes; no)		1.0[d] (Group 1 only)				
4. Would you like to be involved in this program or a similar one next year? (yes; no)		1.9[d] (Group 1 only)				

[a] (____; ____) represents the textual descriptors used as anchoring points (1; 4) for each Likert scale.
[b] Values indicate $\frac{\bar{X} \text{ of Group 1} + \bar{X} \text{ of Group 2}}{2}$.
[c] Values indicate ($\bar{X}$ of Group 1; $\bar{X}$ of Group 2).
[d] Denotes a yes/no question (yes = 2; no = 1).

dimension, *procedures*, addressed the procedures and management of the program. The program's effect on the routine of the school, day-to-day programming, and communication between school personnel and project staff were examples of questions related to procedures. Questions pertaining to *outcomes* or effects completed the survey. Consumers were asked about the observable changes in physical fitness and social interaction of those participating.

Table 4 is a listing of items organized by goals, procedures, and outcomes as well as by consumer groups.

The second change we made in Years 2 and 3 was to use a 6-point Likert scale instead of a 4-point scale. Four points did not allow a sufficient spread to assess clear differences in responding; by broadening the scale, clearer differentiation was fostered.

The results of the Consumer Satisfaction Surveys in Years 2 and 3 were generally positive. We found that those closest to the PACP (i.e., teachers, nondisabled peers) rated it the highest. Those who had least contact (e.g., parents of the nondisabled peers) were not as positive. We realized that our communication to those with less contact needed to be enhanced to make them a part of the program. An illustration of results from a survey administered to one group in Year 3 appears in Table 5.

Table 4

Selected Questions Drawn from Consumer Satisfaction Survey

Goals

Teachers and School Personnel

1. How strongly do you believe that school time should be allotted to programs that deal with physical fitness?
2. How strongly do you believe that school time should be allotted to programs that deal with facilitating social interaction between students with and without disabilities?
3. How important do you feel it is for your students to: (a) learn more about students with(out) disabilities? (b) interact with students with(out) disabilities? (c) assume a helping role with students with disabilities? (d) be friends with students with(out) disabilities?

Parents

1. How important is it to you that your child be physically fit?
2. How important is it to you that your child interact with children who (do not) have disabilities?
3. How much of a role do you think the schools should assume in: (a) teaching children to be physically fit? (b) teaching children about persons with various disabilities? (c) facilitating social interactions between students with and without disabilities?

Nondisabled Peers

1. How much do you like to be physically active?
2. How important do you feel it is for students with and without disabilities to be physically fit?
3. How important do you feel it is for students with and without disabilities to interact socially?

Procedures

Teachers and School Personnel

1. How much did the program affect the routine of your class?
2. How much do you think your students enjoyed the program?
3. Would you be willing to have your students involved in this program next year?
4. How satisfied were you with the way project staff: (a) managed the program? (b) communicated with you about the program? (c) interacted with the student participants?

Parents

1. How much do you think your child has enjoyed participating in this program?
2. Do you think this program should be continued next year?
3. Was the communication from the project staff sufficient?

Nondisabled Peers

1. How much did you enjoy working with students with disabilities in the exercise program?
2. How much did you enjoy the length (# of weeks) of the program?
3. How friendly were the project staff to you?
4. How well prepared were you to work with students with disabilities in the exercise program?
5. Next year, would you like to be involved in this program or a similar one?
6. Would you encourage your friends to be involved in this program next year?

Outcomes

Teachers and School Personnel

1. How valuable do you think this program was for your students?
2. Since this program began in your school, have you noticed any changes in your students in the following areas: (a) interactions with (non)disabled peers? (b) fitness activity level?

Parents

1. How valuable do you think this program was for your students?
2. Since the program began, have you noticed any changes in your child that might be related to the program with respect to: (a) physical fitness level? (b) interacting with (non)disabled peers?

Nondisabled Peers

1. Since the exercise program began, how much more comfortable are you with students with disabilities?
2. Since the program began, have you noticed any changes in your fitness level?

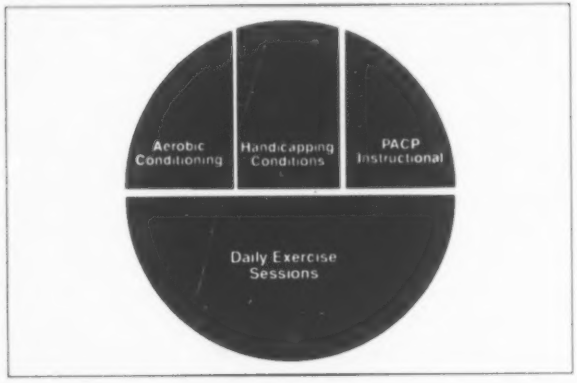
Table 5
An illustration of results from a Consumer Satisfaction Survey
(Scale 1-6. *Scores represent means for each consumer group.)

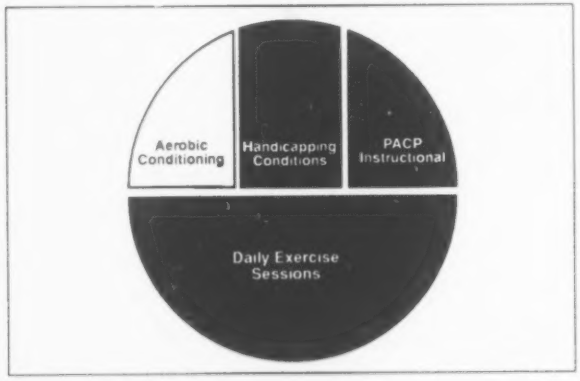
	Nondisabled Students (N=7)	Teachers and School Personnel (N=4)	Parents (Nondisabled) (N=5)	Parents (Disabled) (N=5)
Goals				
Importance for students with disabilities to be physically fit	4.1	5.75	5.4	5.3
Belief that school time should be allotted to physical fitness programs	3.9	6.0	4.8	5.3
Procedure				
Program's effect on the routine of the school class	-	1.2	-	-
Satisfaction with program management	5.4	5.8	4.8	5.1
Satisfaction with program staff communication	5.4	5.8	3.3	4.9
Outcome				
Noticeable changes in the interaction of disabled and nondisabled students	4.6	3.5 (n=2)	2.6	3.8
Noticeable changes in social skills in general	4.0	2.0 (n=1)	2.4	4.2
Noticeable changes in fitness/ activity level	2.8	3.1	2.4	3.8

*A score of "1" indicated absence of the quality measured by the item (e.g., not at all important or no change); a score of "6" indicated an abundance of the quality measured by the item (e.g., very important or a large change).

Section 2
—Components for Program Implementation—
Blood and Guts

Chapter 3
A Training Curriculum for Nondisabled Peers





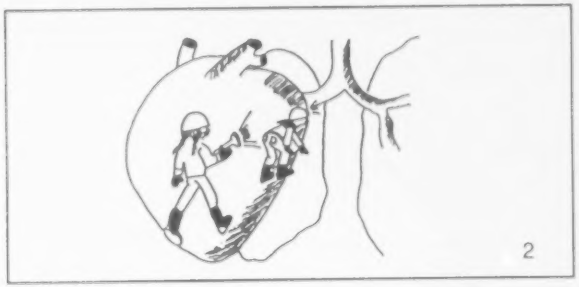
The partnership between the students with disabilities and their nondisabled peers is the key to the success of the PACP model. Thus, careful consideration should be given to the instruction of the nondisabled peers. A training curriculum for nondisabled peers is described in this chapter. It includes curriculum units designed to promote an understanding of aerobic fitness, handicapping conditions, and the procedures used during the exercise sessions. The lesson plans for each curriculum unit are included in this section. Beside the text is a reduced graphic of the overhead projector materials you could use for your classroom presentation (The reproducible overhead projector materials, pre/posttests, and a skills checklist are included in Appendix A).

You may wish to adopt the entire curriculum, or you may want to pick and choose specific content for your purposes. The units were designed for an upper elementary school group. However, there is a lot of information packed into these units to accommodate varying age groups. The presentation could be adapted to meet the educational level of a younger or older student group.

AEROBIC CONDITIONING UNIT—DAILY LESSON PLANS

The daily lesson plans for the aerobic conditioning unit are outlined below. The unit introduces the students to the workings of the circulatory and respiratory systems and then by discussing the benefits of aerobic exercise, weaves together their knowledge of the two systems. There is a lot of information in this unit — much of which may need to be modified or excluded for younger audiences. However, we have covered this topic in detail so that you can filter the material appropriate for your classroom situation. Have fun!!!!

1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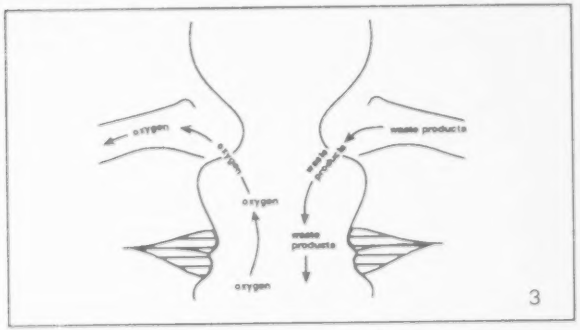

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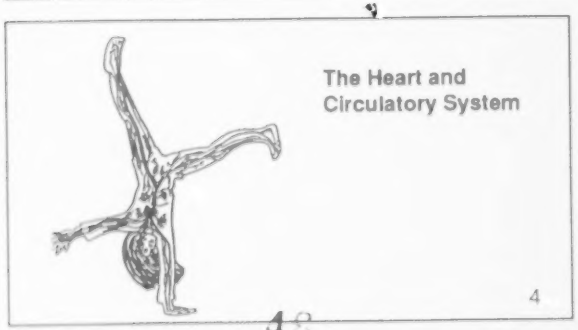

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Introduction

Have you ever played so hard or run so fast that you felt as if you couldn't do any more? What happened? If you were hot and sweaty, you probably stopped under the shade of a tree and plopped down on the ground (#1). Then you lay, panting and gasping for every breath of air and feeling your heart pounding so hard you could feel it in your brain. Have you ever asked yourself what goes on inside your body when you exercise?

That's exactly what we're going to be talking about. We're going to take a look at what's going on in there, and get to know some of the amazing territory of your body. We'll take a close look at your heart and lungs (#2). We'll study them to see how they work together when you're resting and when you exercise. After studying these amazing organs, you'll have a better appreciation of how our bodies work and the importance of keeping them healthy. So, let's get started and have some fun. Be prepared to be amazed at your own insides!

Understanding the Heart and Circulatory System

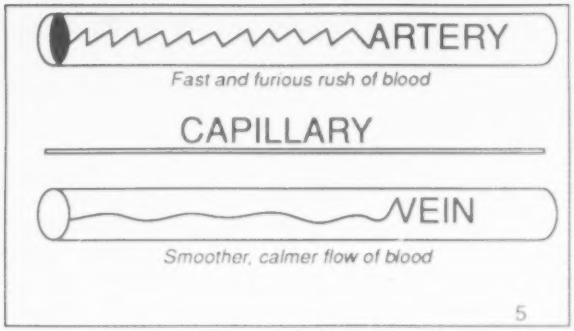
Importance of Circulatory System

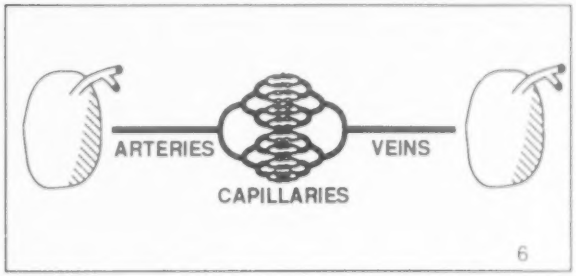
You have inside you miles of blood vessels, billions of cells, hundreds of muscles, thousands of hairs, and quarts of blood. To maintain the billions of cells that make up the human body, there must be a *continuous* stream of oxygen coming into the body and a *continuous* removal of the waste products from the cells (#3). Your body can't store oxygen the way it can store food. There needs to be a constant supply of it to the muscles so that they can do their job. To keep a constant supply, we need to bring the oxygen into our bodies (we do this by breathing), and then we need to have it transported to every cell in the body.

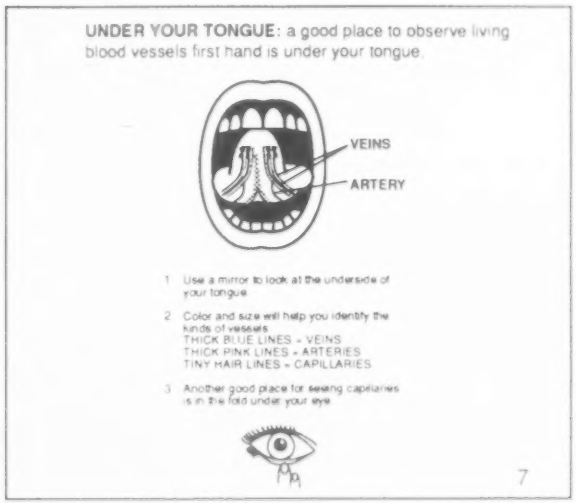
It is the heart and circulatory system that makes sure that the all-important oxygen gets to each cell (#4). The circulatory system is the transportation system of the body, and it performs its job of pumping blood day and night for a lifetime. Let's take a closer look at this hard-working system.

Arteries-Capillaries-Veins

Blood doesn't slosh around inside of you like water in a jug. It flows in a neat, orderly fashion in tubes called blood vessels (#5). There are three different kinds of blood vessels. Each one has a special job. The *arteries* handle the fast and furious rush of






UNDER YOUR TONGUE: a good place to observe living blood vessels first hand is under your tongue.
VEINS
ARTERY
1. Use a mirror to look at the underside of your tongue.
2. Color and size will help you identify the kinds of vessels.
THICK BLUE LINES = VEINS
THICK PINK LINES = ARTERIES
TINY HAIR LINES = CAPILLARIES
3. Another good place for seeing capillaries is in the fold under your eye.
7

blood *away* from the heart (*A*rteries - *A*way: it's easy to remember, *arteries* and *away* both begin with an "A") They are big muscley tubes with thick, elastic walls.

Another kind of blood vessel is called a *capillary*. Capillaries are the smallest blood vessels. Each one is thinner than a single strand of hair. There are millions of capillaries—in fact, every cell in your body is no more than a hair's width away from one.

The reason for every cell being so close to a capillary is that it is here that the *exchange* takes place. Oxygen and other nutrients pass out of the blood and into the cell while waste products pass out of the cell and into the blood.

The third type of blood vessel is a *vein*. Veins return blood to the heart and lungs. Blood flow in the veins is not nearly as vigorous as it is in the arteries. To compare this flow, imagine a river. Picture the frantic rush of a river over rocks versus the calmer flow further downstream. The frantic rush is in the arteries; the downstream flow is in the veins. The blood in the veins moves slowly and smoothly.

So, let's see how these three types of blood vessels work together (#6). When the blood leaves the heart, it is pumped into the arteries. The arteries that leave the heart are very thick tubes, but they soon branch again and again to form many smaller tubes. The arteries split into tiny blood vessels called capillaries. The capillaries supply oxygen that the muscles need for movement. They also pick up the waste products from the cells. The capillaries lead from the muscles and organs into bigger and bigger blood vessels called veins. The veins collect blood from all over the body and take it back to the heart. The entire trip from the heart out to the muscles and organs and back again takes less than one minute and this network comprises about 60,000 miles.

ACTIVITY: UNDER YOUR TONGUE

From: *Blood & Guts: A working guide to your own insides page* 54.

Equipment needed: mirrors, overhead #7.

Procedures: explanation provided on overhead

The Heart: A Look from the Inside

Now we know oxygen-rich blood travels out of the heart through the arteries to the capillaries. In the capillaries, the oxygen is dumped off in the cells and waste products are picked up. The blood then travels back to the heart through the veins. But some big

questions still remain. What happens to the blood in the heart? How does the blood get oxygen? What happens to the waste products picked up from the cells? Let's take a closer look at the heart to answer these questions.

Let's start by getting an appreciation for how hard your heart works.

ACTIVITY: TENNIS BALL SQUEEZE

From: *Blood & Guts: A working guide to your own insides* page 50.

Equipment needed: tennis balls (1 ball/team), 1 stop watch, overhead #8

Procedures:

1. Divide class into pairs. Give 1 tennis ball to each pair.
2. Use overhead to demonstrate how they should squeeze the ball so that it is indented.
3. Tell students that when you say "begin," they should forcefully squeeze the tennis ball every time you say "Squeeze."
4. One member of the pair holds the ball. Start the stop watch and every second tell them to squeeze (continue for 1 minute).
5. Ask the students how they feel. Could they do it for an entire day without stopping? Two days?
6. Explain that a normal heart (at rest) beats anywhere from 60-100 beats/min. They are getting some idea how hard the heart works at rest. Imagine what it would feel like during exercise.
7. Allow second member of the pair to try it.

Parts of the Heart

Now that you have an idea of the strength of the heart, let's find out more about it. Your heart is a hollow muscle about the size of your fist. Many people think that their heart is on the left side but that's not quite true. It actually hangs near the center of the body (#9). The pointed tip at the bottom of the heart sticks out and touches the left side of the chest. This is the spot where it is most easily felt.

If you could look inside your heart, you would see two pumps working side by side (#10). On your right side (note: right side of your body but left side if you were looking at someone) is the pump that pumps blood to your lungs to pick up oxygen. On the left side is the pump that pumps oxygen-rich blood out to your body.

Both pumps are divided into two spaces called chambers. Each top chamber is called an *atrium*. The bottom ones are called *ventricles*. Depending upon which pump

Tennis Ball Squeeze Try to do a heart's work with your hand. Test the ease with which you can squeeze, and get a grasp of this mighty muscle.

1. The force needed to squeeze a tennis ball is similar to the force needed to squeeze blood out of the heart.
2. If you squeeze 60x a minute (a normal pulse), you will get a good idea of how hard the heart works.

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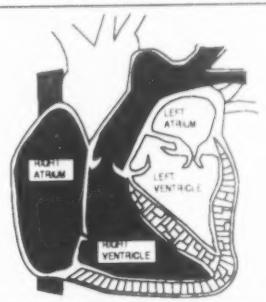

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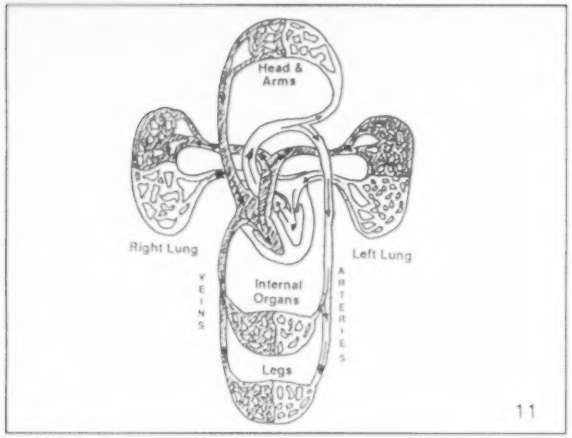
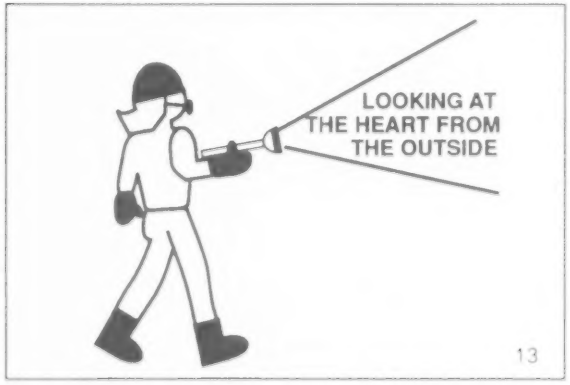


THESE ARE:
THE HEART FACTS
The heart circulates the body's blood more than 100 times each day!
The heart pumps 5000 to 6000 quarts of blood each day! (at rest)
Laid end to end, all the body's blood vessels would measure about 60,000 miles!
Your heart is about the same size as your fist!
12



they belong to, they are either the *right* or *left* atrium and the right or left ventricles. The two sides of the heart do *not* work independently; they are precisely timed as a team.

Blood Flow

The pumping system of the heart is very efficient. Your blood makes 1000 complete trips around your body each day and as you already know, each trip takes less than one minute. Let's trace a drop of blood through the system to see how it all works (#11).

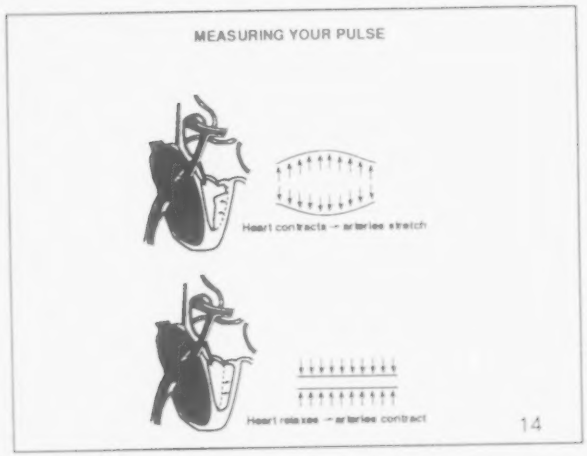
Oxygenated blood leaves the *left ventricle* (we'll find out how it gets oxygen in just a minute, be patient) through the aorta. From the aorta, some of the blood goes upward to feed the cells of the head and neck, and particularly the brain. Other oxygenated blood travels to the organs, chest, pelvis, and legs. Other blood goes to the heart muscle itself (it might seem silly for the heart to have its own vessels because it fills up with blood so many times during the day, but the blood the heart pumps doesn't get to the heart muscle cells that do the work). The arteries divide into smaller and smaller branches. From the arteries, the blood flows into the capillaries. In the capillaries, the oxygen in the blood is delivered to the cells while the waste products from the cells are picked up by the blood. The capillaries converge to form larger vessels called veins. The veins return the oxygen-poor blood and the waste products to the heart. The blood flows into the *right atrium* and is dark in color. When the right atrium is full it contracts and the blood travels to the *right ventricle*. Then the right ventricle contracts and the blood is sent through the *pulmonary artery* to the lungs. It is in the *lungs* that the blood gets its new supply of oxygen. In the lungs, carbon dioxide (a waste product from the cells) passes out of the blood into tiny air sacs, and oxygen from these air sacs passes into the blood. Even though it is the same blood that carried the wastes, it has now unloaded them and taken on a new cargo of oxygen. The oxygen-rich blood is now bright red. It travels back to the heart through the *pulmonary vein* and empties into the *left atrium*. When the left atrium fills, the blood flows to the *left ventricle*, where it is again pumped out to the entire body. The heart *never* rests.

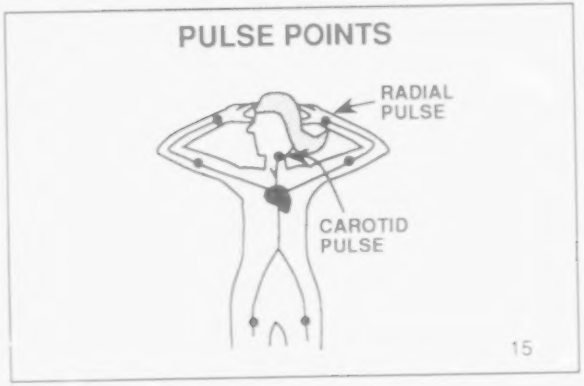
Heart Facts

The heart truly is amazing (#12). Think about some of the facts that you have learned.

The Heart: A Look from the Outside

We've taken a close look at the heart from the inside. We've followed the pathway of blood through the heart to the body and back again. But doctors and scientists can't always look at your heart that way—they need to study your heart from the outside too (#13).





How can they do that? We're going to look at some of the ways the heart can be studied from outside your body. These methods are commonly used by health practitioners to determine how healthy your heart is.

Pulse

One of the ways you can find out about the heart from the outside is by feeling your pulse. The pulse is caused by the blood stopping and starting as it rushes through your arteries (#14). When the heart contracts (pumps), it forces blood out into the arteries. The walls of the arteries stretch. As the heart relaxes, the artery walls contract to push the blood along. Each time the artery walls expand and contract is one pulse beat. By measuring your pulse you can find out how hard your heart is working.

Arteries are usually located far below the skin for protection (If your aorta were suddenly cut, blood would squirt six feet into the air - it would be very difficult to stop the flow). However, they do come closer to the skin at several points on your body. It is at these points that you can feel your pulse. Check this chart to help find your own pulse points(#15).

ACTIVITY: PULSE PRACTICE

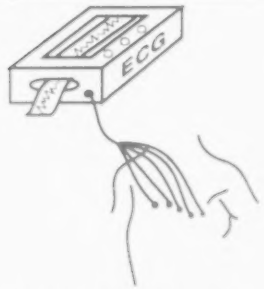
Equipment needed: overheads #15 and #16, watch with second hand

Procedures:

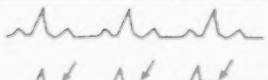
1) Have each student locate a pulse point (preferably wrist or carotid).
2) Have them start counting the number of times they feel a beat when you say to begin.
3) Count pulse beats for 1 minute and have students stop.
4) Show them average resting heart rates on overhead. Ask them what they think about the statistics. Why would a long-distance runner have a lower heart rate than a weight lifter? Explain that as one becomes more physically fit the heart becomes stronger. Thus, with each heart beat, more blood is pumped out of the heart. Consequently, the heart doesn't have to beat as often during rest or light work.

ASSIGNMENT: PULSE SURVEYS:

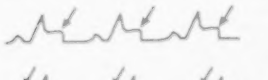
Design a survey to: 1) test if it is true that younger people have faster heart beats, or 2) find out how body size and heart rate are related (test your pets) or 3) find out if average heart rates for boys is more, less, or the same as girls.



Electrodes picking up the electricity in the heart. 17

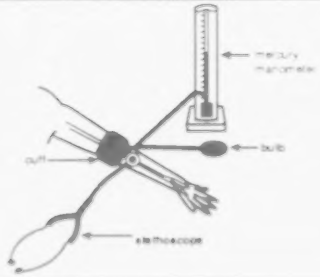


= A Normal ECG



= Evidence of a Heart Attack

= Heart disease in the left atrium. Could be valves, hypertension, or heart disease 18



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ECG

A second way we can find out about the heart from the outside is by using a machine that records electricity from the heart(#17). The machine is called an *electrocardiograph* or *ECG*. Did you know that your heart produces electricity? Not enough to give you a shock, but it sends out enough to keep the heart muscles contracting. If you put electrodes on the chest, the ECG machine can pick up the heart's electricity. The tracings on the machine can tell the doctor how the heart muscle is contracting, if the valves are working properly, and whether the muscle is pumping as it should.

ACTIVITY: A RESTING ECG

Equipment needed: ECG, electrodes, and supplies, overhead #18

Procedures:

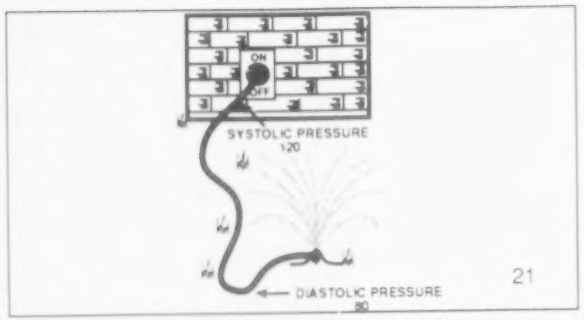
1) Choose 1 male volunteer from the class.
2) Have nurse/practitioner put electrodes on volunteer.
3) Take a resting ECG.
4) Pass samples of tracings around class.
5) Show overhead and briefly show examples of what doctors look for when interpreting the tracings(#18).

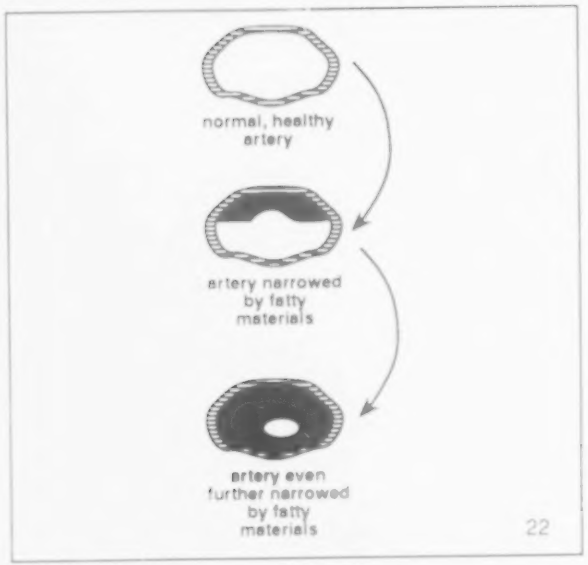
Blood Pressure

Another way we can learn about the condition of the heart from the outside is by measuring blood pressure. Blood pressure is simply the pressure with which blood circulates through the arteries. The instrument used to measure blood pressure is called a sphygmomanometer (#19). It consists of an inflatable cuff, a rubber bulb to inflate the cuff, and a device that measures the pressure. A stethoscope is used to listen for certain characteristic sounds in the artery.

Blood pressure is recorded by two numbers (#20). For example, a normal blood pressure is 120/80. The 120 mmHg measures the level of pressure at each contraction of the heart. The 80 mmHg measures the level of pressure when the heart relaxes and tells us about the resistance in the arteries.

To understand this, think of a garden hose attached to a sprinkler (#21). When you turn the water full force at the spigot, the pressure inside the hose increases. If you





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measured the pressure in the hose when you first turned on the water that would be the top number (the systolic pressure). If you measured the pressure in the hose by the sprinkler that would be the bottom number (the diastolic pressure). What do you think would happen to the pressure if we turned on the water full force but used a narrower hose? A wider hose? This is what happens when we measure blood pressure. The spigot is the heart pumping blood, the hose is the pathway of arteries, the sprinkler the capillaries. What would happen if the arteries from the heart narrowed as in the example when we used a narrower hose? The arteries can get narrower too. This is called atherosclerosis (#22). Blood flows through arteries easily at a young age. But, because of a number of factors (diet, lack of exercise, heredity, etc.) little lumps of fatty materials may stick to places inside the arteries with age. Those fatty lumps called plaque may grow bigger and harder. When this happens the arteries do not work as well because they become narrower and narrower and it is harder for the blood to get through. Thus, the heart has to work much harder to pump the same amount of blood. What do you think would happen to the blood pressure?

When blood pressure is higher than normal it is called hypertension. Hypertension is a major public health problem because it is so widespread and because it creates a greater risk of heart attacks, strokes, and kidney disorders. So, monitoring blood pressure is another means of monitoring the condition of the heart.

ACTIVITY: A RESTING BLOOD PRESURE

Equipment needed: sphygmomanometer, stethoscope

Procedures:

1) Choose a volunteer.
2) Measure resting blood pressure.
3) Explain that the first sound you hear is the systolic blood pressure. Remember that number. When the sound stops that is the diastolic blood pressure. Remember that number. Set up a station in the classroom where they can practice during a free-time period.

Understanding the Lungs and Respiratory System

Introduction

Think back to the scenario with which we began (#1). Remember, we talked about how after you have played really hard and fast you collapse on the ground, panting and

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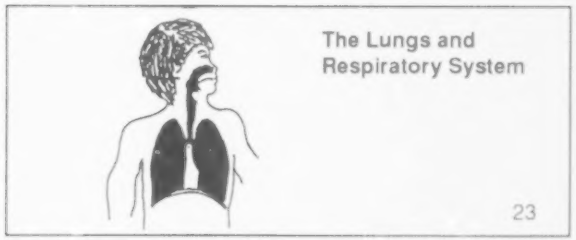

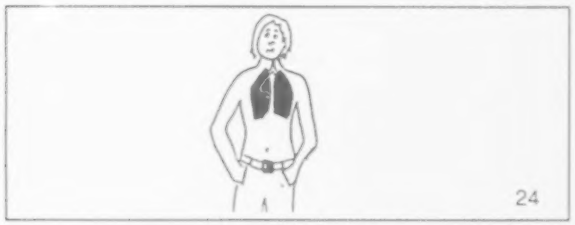

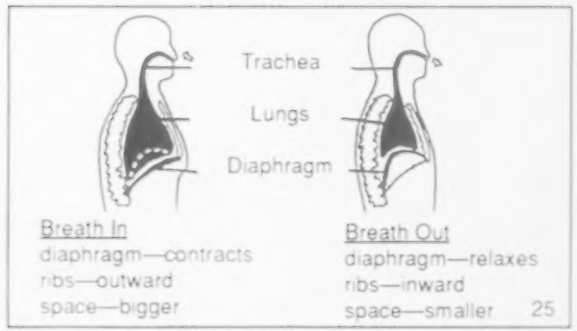

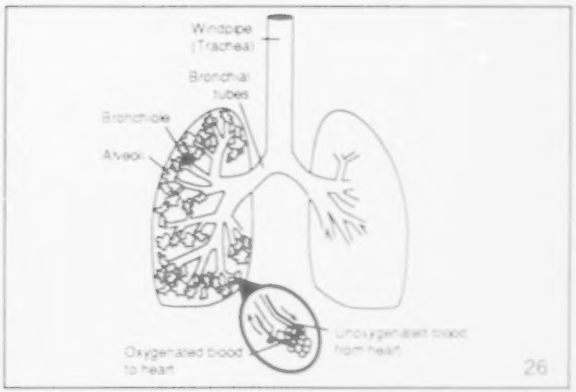

gasping for air, and you feel as if your heart is pounding so hard that you can feel it in your brain? And remember we said we would talk about what was going on in there, so that we would have a better appreciation of how the body works and the importance of keeping it healthy?

Before we talk about how we can *keep* it healthy, let's take a closer look at the other system our body uses in the scenario above. We've already talked about the heart. Now let's look at how we get air into our bodies (#23). Let's take a closer look at the lungs and the respiratory system. Then we will see what happens to these systems when we exercise.

All animals need oxygen to live. We get oxygen from the air. It is our lungs that pump in the air and pull out the vital oxygen that each cell needs to do its work. Let's see how the lungs carry out this important job.

The Lungs: A Look from the Inside

Appearance

Guess how big your lungs are? Actually they are the size of a pair of footballs and they fill the chest from the neck to the ribs (#24). The lungs themselves are like big spongy balloons that are continually at work breathing in air and breathing out carbon dioxide. The lungs have no muscles of their own, they depend completely on the muscles of the rib cage and diaphragm.

Oxygen transport

Mechanics of breathing

When you breathe *in*, the diaphragm contracts and drops down (#25). At the same time your ribs expand outward. The space in your chest gets larger. Air rushes in to fill the space. When you breathe *out*, the diaphragm relaxes into its "up" position. At the same time, your ribs move inward and the space gets smaller. Air is squeezed out.

Pathways

Now that we see how air gets in and out of our body, let's see what happens to it inside (#26). Just as we followed a drop of blood through the circulatory system, let's trace the path of a molecule of air through the respiratory system. The rib cage expands outward, the diaphragm contracts and moves downward, the space gets bigger so air rushes in through your *nose* and down your *windpipe*. It continues down the windpipe where it flows into the *bronchial tubes*. The bronchial tubes divide into smaller and smaller branches called *bronchioles*.

At the end of these branches, the air flows into little bags called *alveoli* (There are about 600 million of these spongy little bags). The walls of the alveoli are very thin and are surrounded by lots of tiny capillaries. It is here, where the alveoli and capillaries are close together, that the important exchange occurs. *Oxygen* from the air just inhaled moves into the blood in the capillaries and the carbon dioxide (a waste product from the body's cells) moves into the alveoli.

Once the exchange is made, the blood with oxygen in it goes back to the heart. Then the rib cage contracts, the diaphragm relaxes upward, the space gets smaller, and the air with the carbon dioxide in the alveoli is squeezed through the bronchioles to the bronchial tubes through the windpipe and out through the nose and mouth.

ACTIVITY: LUNG EXHAUST

From: *Blood & Guts: A working guide to your own insides* (page 65).

Equipment needed: plastic bags and ties (small bags), candles set in glasses, overhead #27 and #28

Procedures:

1. Show overhead #27. Provide each student with a plastic baggie and a tie.
2. Have each student form a snug seal over their nose and mouth and breathe into the bag. Ask them to count the number of times they can breathe in and out of the bag before it gets uncomfortable. Caution them that it is important to stop when it gets uncomfortable.
3. Have them knot the bag when they are done.
4. Ask them what happened to their breathing rate and why it changed. Explain: Yes, as you continued to breathe into the bag there was less and less oxygen. You initially breathed in oxygen from the room. When you covered your nose and mouth with the bag you no longer brought in oxygen. As you continued to breathe the air from the bag, your cells took out the oxygen and put in their waste products, namely carbon dioxide. The more and more you breathed, there was less and less oxygen and more and more carbon dioxide.
5. Light candles in glasses at the front of the room (#28). Ask for two volunteers to bring their sealed bags to the front of the room.
6. Have them pour a bag of air over the candle. Watch what happens. Then have them pour their bag of lung exhaust over the candle.
7. Ask them to comment on the findings.

In the Bag—A good way to prove that something is happening to the air you breathe is to try breathing it several times. If it becomes unbreathable then you can be certain some changes are happening within your lungs.

CAUTION: breath is a matter of life and death. Try this experiment *once*, then discard the plastic bag.

1. Use a small plastic bag
2. Breathe into the bag once
3. How many times can you inhale the same breath before it gets uncomfortable? *Stop* before it does!
4. Knot the bag so that the exhaled gas can't escape

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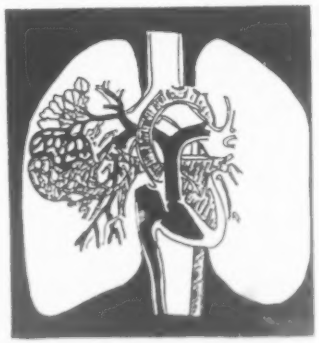
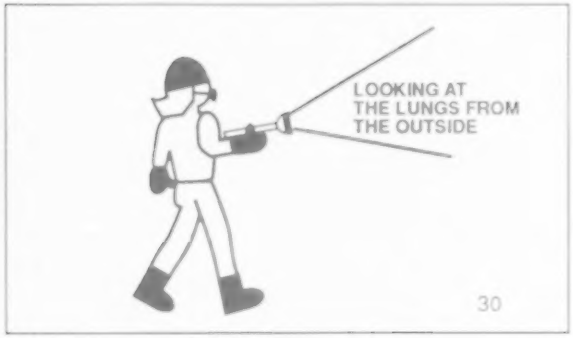
Lung Exhaust—What goes in doesn't necessarily come out. There are changes happening to the air you breathe, changes you can't see or feel. You can test your lung exhaust by comparing it to a bag of air the same size.

1. Carefully pour a bag of air over a burning candle
2. Carefully pour your bag of exhaust over a burning candle

28





TIDAL VOLUME (Amount of air in each breath)	BREATHING RATE (Number of breaths per minute)	TOTAL AIR (Amount of air into lungs per minute)
1/2 Quart	12	6 Quarts

31

Hopefully, if all goes well, what you and your students should see is that the candle goes out. The lung exhaust lacks the oxygen necessary to keep the candle burning—if enough exhaust is poured over the candle, it should go out.

You might want to practice this before you try it.

Putting it all together

We have a lot of information now. We know how the heart works and we know how the lungs work. But, do you have the picture of how they work together as a team (#29)? Is anyone brave enough to try to go through the whole process? (ask for volunteers).

The Lungs: A Look from the Outside

Now we know how the lungs work from the inside. But, just as with the heart, doctors often need to check your lungs from the outside (#30). Let's look at how they can study your lungs from outside your body.

We can learn about the lungs from the outside by measuring your *breathing rate* and your *tidal volume*. Your breathing rate is the number of breaths you take each minute. How many times do you think you breathe air in and out each minute? (Ask for some guesses). Let's try it and see.

ACTIVITY: MEASURING BREATHING RATE/TIDAL VOLUME

Equipment needed: overhead #31 and #32, stop watch, quart containers

Procedures:

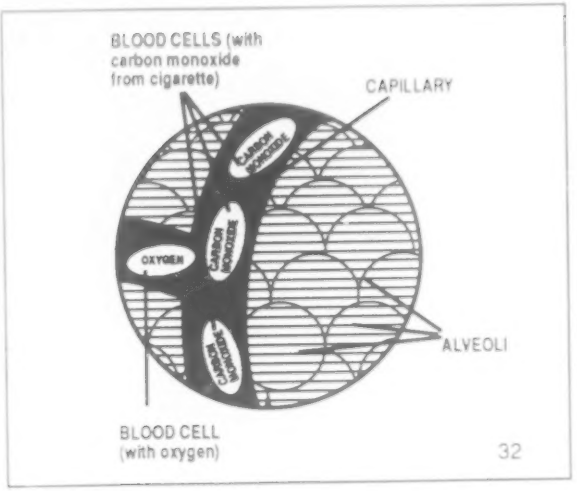
1) Tell students that when you say "begin," they should start counting the number of times they breathe in and out (1 inhalation + 1 exhalation = 1 breath).
2) Start the stop watch and have students count their breaths for 1 minute. Have them write down that number on a piece of paper (#32).
3) Explain that the number of breaths per minute decreases as one gets older. Babies breathe about 30-40 times per minute, whereas when you get older it will decrease to about 12-15 times per minute.
4) Explain *tidal volume*. The amount of air you take in with each breath is called tidal volume. In any one breath, you will never completely fill your lungs. Usually only 3/4 of the total amount of air that your lungs can hold

is inhaled. When you are sitting here you are breathing approximately 1/2 quart of air. Knowing that, let's see how much air you get into your lungs each minute.

5) Calculate amount of air into lungs per minute and show them the quart containers to give them an idea of how much air they breathe per minute.

Amount of air in each breath (tidal volume)	x	Number of breaths/minute (breathing rate)	=	Total air into lungs/minute
sitting 1/2 quart	x	12	=	6 quarts

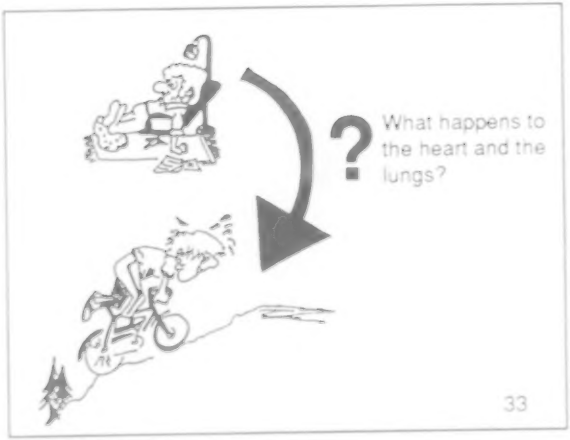
6) Note about smokers: Remember how air travels into and out of the lungs? Think about the alveoli/capillary connection at the end of the pathway. When someone smokes a cigarette, the cigarette smoke travels down the same pathway to the alveoli (#32). Carbon monoxide in cigarettes latches onto the blood in the capillaries 250 times faster than oxygen can. That means not as much oxygen gets in the blood as normally would. So . . . smokers may have to breathe harder to get the same amount of oxygen delivered to the muscles.

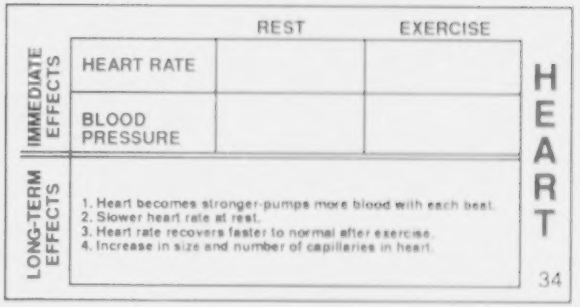


By looking at the total air into the lungs per minute one may get *some* idea if the lungs are having to work harder than normal. If one isn't getting a normal amount of air into the lungs each minute, it may indicate some problem. However, this is by no means a conclusive measure.

Effects of Exercise on the Heart and Lungs

Now you all probably realize that the body is an amazing machine. As you sit here, the heart muscle circulates 5000-6000 quarts of blood more than 1000 times each day without ever stopping. You are inhaling about 1/2 quart of air in every breath, while the lungs are separating out the vital oxygen needed by each cell in your body. It's amazing. Now, suppose you get up and start biking up a big hill at a comfortable pace (#33)? What happens to your heart? What happens to your lungs? What is the inside story? Let's experiment to see what happens inside by testing our bodies on the outside.





Effects of Exercise on the Heart

ACTIVITY: LOOKING AT HEART RATE

Equipment needed: overhead #34, stop watch

Procedures:

1) Have each student locate a pulse point.
2) Start stop watch and have students count their pulse beats for six seconds (Have them add a zero to the number they counted. For example, if they counted seven then their heart rate would be 70. Ask a student to report his or her heart rate and record it under resting heart rate on overhead).
3) Now have all students stand up. Have them jog in place for two minutes. Have them locate their pulse during minute two. Tell them to stop. Have them count their pulse for six seconds (Have them add a zero to the number. Ask the same student who was chosen previously to report his or her heart rate and record it under exercise heart rate on overhead).
4) What happened? Why do you think your heart rate goes up? (Wait for responses). Explain that because your muscles have especially big appetites when you exercise, the heart must beat faster to give them the oxygen they need.

ACTIVITY: LOOKING AT BLOOD PRESSURE

Equipment needed: sphygmomanometer, stethoscope, overhead #24

Procedures:

1) Choose a volunteer.
2) Measure resting blood pressure. Record on overhead for activity above.
3) Have volunteer jog in place for two minutes. Take another blood pressure. Record it on overhead.
4) What happened? Why do you think the top number - the systolic blood pressure went up? Explain: Remember the garden hose. The force of the water as it comes out of the spigot is like the systolic pressure. Systolic blood pressure is the pressure at each contraction of the heart. When you exercise, the heart has to contract with more force and has to contract more often - so, the systolic pressure goes up.

What about the bottom number? What happened to it? Why do you think it stayed the same (or went down a little bit)? Explain: The diastolic blood pressure is the level of pressure when the heart relaxes and it tells us about the resistance in the arteries. When you exercise, your arteries increase in diameter to allow the larger amount of blood to pass through. It's a good thing too! Imagine the garden hose. If you turned the water on full force at the spigot (blood coming out of the heart), it would be much harder for the water to travel through a narrow, skinny hose as opposed to a wider, fat hose.

If our bodies are healthy, they do this for us. When you begin exercising, your heart automatically begins to beat harder and faster and your arteries expand to carry the greater amounts of blood. Because your arteries have expanded, the pressure inside does *not* increase. Therefore, the diastolic blood pressure stays the same.

A special note. Note we said that if our body is *healthy*, it does this for us. Well, sometimes when people don't take care of themselves (don't exercise, eat a lot of fatty foods, smoke, etc.) they have blood pressure problems. Their systolic blood pressure may rise too rapidly or their diastolic pressure may increase. Thus, their hearts are working very hard, pumping out more and more blood, but their arteries (the garden hose) don't expand to meet these increases. This can be a dangerous situation. These people should exercise with supervision. This is one reason it's important to take care of your body.

Immediate effects

In summary, we see that while we exercise our heart rate increases, our systolic blood pressure increases, and our diastolic blood pressure decreases or stays the same. These measurements we took are only a few of the *immediate* effects of exercise on the heart. By immediate effects, we mean the changes that take place immediately as the body responds to the increased stress of exercise. These changes occur regardless of the shape a person is in. They are just the necessary changes the body needs to make to handle the increased workload.

Long-term effects

There are also *long-term* effects. If exercise is continued on a regular basis, gradual changes take place in the body. These changes are more permanent in that even when you are not exercising, these changes remain. Let's talk about some of these

long-term effects of exercise on the heart.

After you stick with an exercise program for a while, your heart becomes stronger. Because it is stronger it pumps more blood with each beat. Because it pumps more blood with each beat, it doesn't have to beat as often, thus the heart rate goes down. A slower heart rate at rest and during exercise means that the heart has a little bit more time to rest between contractions (the heart likes that). Also, when someone is in good shape, the heart rate recovers more quickly to its normal resting rate after exercise.

Another amazing long-term effect of exercise on the heart is an increase in the size and number of capillaries. More capillaries give the heart more nourishment so that the cells can get oxygen and nutrients more easily and the waste products can leave more effectively.

Effects of Exercise on the Lungs

Let's take a look now at the lungs. We'll experiment to see the immediate effects of exercise on the lungs, and then we'll discuss some of the long-term effects. Before we begin, tell me what you think some of the immediate effects might be (write responses on the board). What about long-term effects?

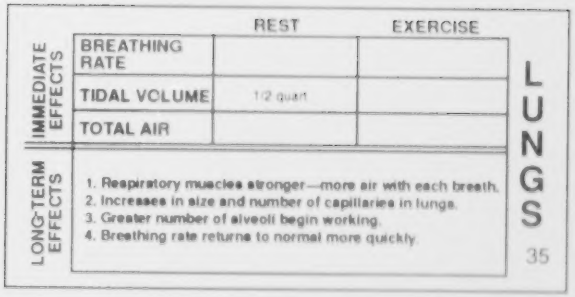
Immediate effects

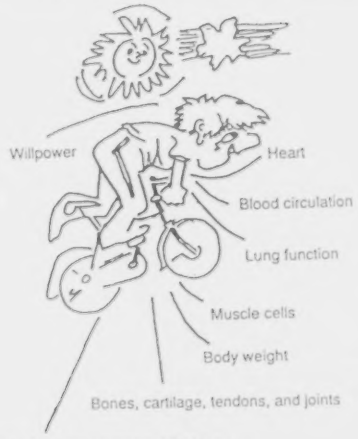
ACTIVITY: BREATHING RATE: BREATH VOLUME

Equipment: overhead #35, stop watch, quart containers

Procedures:

1) Have each student count the number of times he or she breathes in and out.
2) Start stop watch and have them count breaths for one minute. Ask a student his or her breathing rate and record the number on overhead.
3) Have students stand up and jog in place for three minutes.
4) At the beginning of minute three, start the stop watch and have students count their breaths for the entire minute. Ask the same student his or her breathing rate and record it under exercise on overhead.
5) Complete the overhead chart to determine the total amount of air that enters the lungs each minute at rest and during exercise.





From Stromme & Skard: *Physical Fitness Testing* p. 11.

Designing a Safe and Effective Exercise Program

37

Immediate effects

As you can see, an immediate effect of exercise is the increase in the rate and depth of breathing. Why do you think this occurs? Yes, it is a response to the body's need for more oxygen, and the need to get rid of the increased amounts of carbon dioxide. Remember it is in the alveoli, the tiny air sacs in the lungs that connect to the capillaries, that the exchange takes place.

Long-term effects

Let's discuss the long-term effects of exercise on the lungs. Lung function improves. Regular physical exercise has a positive effect on the lungs and respiratory system. The respiratory muscles become stronger so that more air is brought in with each breath. Also, there is an increase in the size and number of capillaries in the lungs, so more oxygen can be taken in and more CO_2 removed. Furthermore, a greater number of alveoli begin working so that even more oxygen can be delivered to the cells. Finally, when in good shape, you breathe more slowly at rest, saving extra energy, and your breathing rate returns to normal more quickly following exercise.

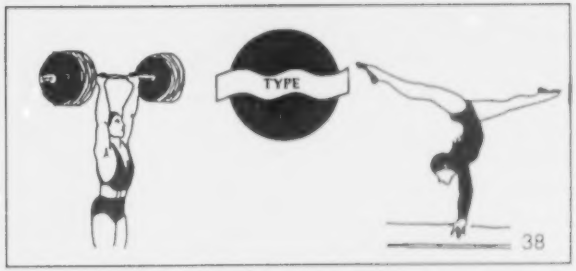
Summary

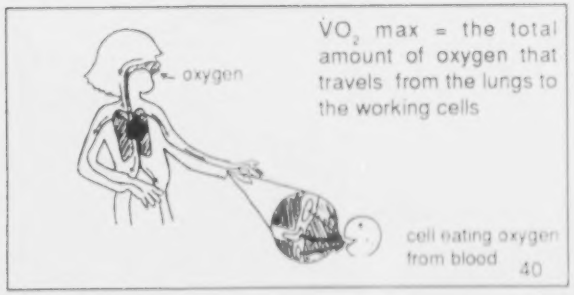
The overall effect of exercise in terms of your health, is the ability to work more efficiently and for a longer period of time without getting tired. Regular physical activity has a multitude of health-promoting effects—not only what we've seen in the heart and lungs, but in all kinds of ways (#36). Unfortunately, however, interest in keeping the body healthy is aroused only once something goes wrong. In our society, where people spend so much time taking care of their cars, their houses, and their bikes, you would think that they would also take care of their human machine—their bodies. Next we are going to see how we can take care of our bodies safely and effectively.

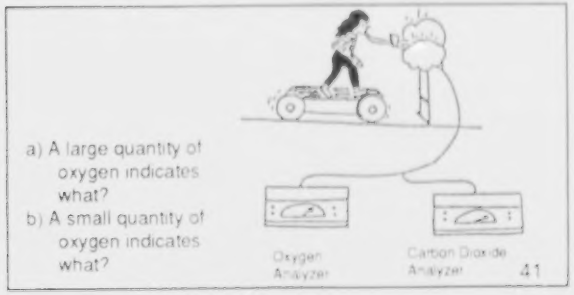
Developing a Safe and Effective Exercise Program

Introduction

Is everyone ready to exercise? After studying the heart and lungs, and the effects of exercise on them, we hope you are ready to start an exercise routine. Let's look at some considerations in starting an exercise program (#37).




oxygen
$\dot{V}O_2$ max = the total amount of oxygen that travels from the lungs to the working cells
cell eating oxygen from blood
40


a) A large quantity of oxygen indicates what?
b) A small quantity of oxygen indicates what?
Oxygen Analyzer
Carbon Dioxide Analyzer
41

Type

When the fitness bug bites, the logical question arises: "What is the best kind of exercise for me?" What do you think is the best *type* of exercise(#38)? (Wait for responses). The answer depends upon your individual objectives. If you want muscular fitness, then lifting weights is the best method. If you are concerned with flexibility, then yoga or stretching calisthenics is the answer. However, if you are interested in your general health (keeping the heart and lungs healthy), then endurance activities are the only form of beneficial exercise. Endurance activities that require stamina or "good wind" are called *aerobic* exercise (#39). Aerobic means "in the presence of oxygen," and aerobic fitness is the body's ability to take in oxygen, move it to the working cells, and use it. The total amount of oxygen that travels from the lungs to the working cells is called the *maximal oxygen uptake* or *$\dot{V}O_2$max*.

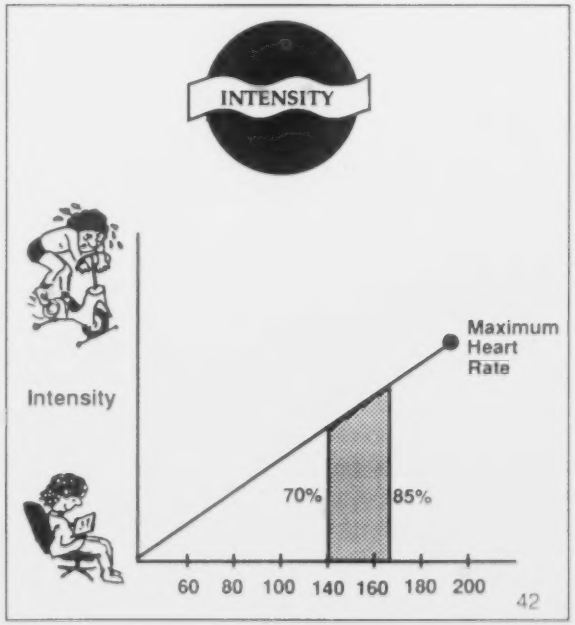
Exercise scientists and doctors feel that $\dot{V}O_2$ max is the single best measure of overall fitness (#40). Let's see why. Again, $\dot{V}O_2$ max is the total amount of oxygen the body can bring in, transport, and use in the working cells. Let's dissect that. (1) $\dot{V}O_2$ max is the total amount of oxygen the body can *bring in*. What system in the body is required to *bring in* oxygen?—the lungs and respiratory system. So, if the respiratory muscles (remember the muscles of the rib cage and diaphragm) are strong, more oxygen can be brought into the body. (2) $\dot{V}O_2$ max is the total amount of oxygen that can be transported. Which system is required to *transport* oxygen?—the heart and circulatory system. So, if the heart muscle is strong and the blood vessels are in good condition, more oxygen can be transported to the working tissues. (3) $\dot{V}O_2$ max is the total amount of oxygen that is *used* by the working cells. So, if the muscles are toned and in good shape, the cells can absorb and use more oxygen. Hopefully, you now understand why $\dot{V}O_2$ max is considered the best measure of fitness—after all, to get a measure of $\dot{V}O_2$ max, the heart, lungs, and muscles all must perform.

$\dot{V}O_2$ max is most accurately measured by a graded exercise test (#41). This test requires that a person walk on a treadmill (see overhead) or pedal a cycle ergometer (stationary bicycle) while the heart rate and blood pressure are closely monitored. The air that the person breathes out is collected in big bags, and is then put through different machines to see how much oxygen is in it (Remember the little experiment that we did with lung exhaust? There was so much carbon dioxide in the air we breathed out that it put out the flame of a candle). Well, when scientists collect the expired air they look to see how much oxygen was used in the body by measuring how much is in the expired air. If there is a lot of oxygen in the expired air, what does that mean? It means that the body is not as efficient as it should be in using the oxygen. The person may not be in very good shape. On the other hand, if there is not very much oxygen in the expired air, that means the body was efficient in using the oxygen. The person probably is in good shape.

Therefore, in summary, when asked the question "what *type* of exercise is best?" The answer is endurance activities—aerobic exercise. We've already said aerobic exercises require "good wind"—activities such as running, walking, biking, cross-country skiing, swimming, etc. Moreover, aerobic activities that rely on larger lower body muscles, such as walking and cycling are superior to those such as push-ups or weight lifting, which utilize only the smaller upper body muscles. And, exercises involving continuous muscular action generally produce more significant increases in aerobic fitness than discontinuous sports such as tennis and basketball.

So, as you can see, there is no one best aerobic exercise. There are many that are good. You need to consider what you *like* best and what fits into your lifestyle the best. For instance, here in Champaign-Urbana, Illinois, cross-country skiing would not be the best exercise because there are so few days you could ski. No matter which one you select, there are three things that you need to consider when determining the value of that exercise in terms of how good it is for your heart and lungs. Those things are: 1) the intensity of the exercise, 2) the duration of the exercise, and 3) the frequency of the exercise.

Intensity



The *intensity* of the aerobic exercise you select is very important (#42). Intensity is "the sensation of effort." For instance, running uphill to catch a school bus is certainly harder than walking your dog around the block! You can feel the difference in effort. The sports scientist needs an objective measure of exercise intensity. One of the ways they measure intensity is by measuring heart rate.

Let's see why heart rate is a good measure. Remember our experiment when we measured your heart rate when you were resting, and again after you exercised. As you exercised harder, your heart rate went up. This means you have a lower heart rate when you're resting, and it gets faster as the exercise intensity gets harder (See graph on overhead #42). The heart beats faster and faster until it just can't beat any faster. This point at which it is beating as fast as it possibly can is called your *maximal heart rate.*

The benefit of any exercise is closely related to intensity. What is the best intensity? Is it true that the harder you exercise the better it is for you? Research has found some interesting things. Scientists have found that there is a certain range of intensity that is best for improving the condition of your heart and lungs. Look at the graph of heart rate and intensity again. The range that scientists have found to be the best is the 70-85 percent range. Between 70 percent and 85 percent of your maximum heart rate is the best intensity. If your heart rate doesn't get as high as 70 percent HRmax, then there is typically not enough stress put on your heart and lungs to improve their condition.

On the other hand, if you exercise so hard that your heart rate goes above 85 percent HRmax, then there may be a good chance that you may injure your bones or muscles. Scientists are saying, then, that there is an optimal intensity level. If you don't exercise hard enough, you may not improve the condition of your heart and lungs. On the other hand, if you exercise too hard, you may hurt your bones and muscles.

Now that we know there is a safe and effective level of exercise, the next question is how do we determine the correct level for each individual? What is each person's correct heart rate, and safe range? Let's find out.

ACTIVITY: DETERMINING TRAINING HEART RATES

Equipment needed: paper & pencil, calculators (if available), stop watch, overhead #43

Procedures:

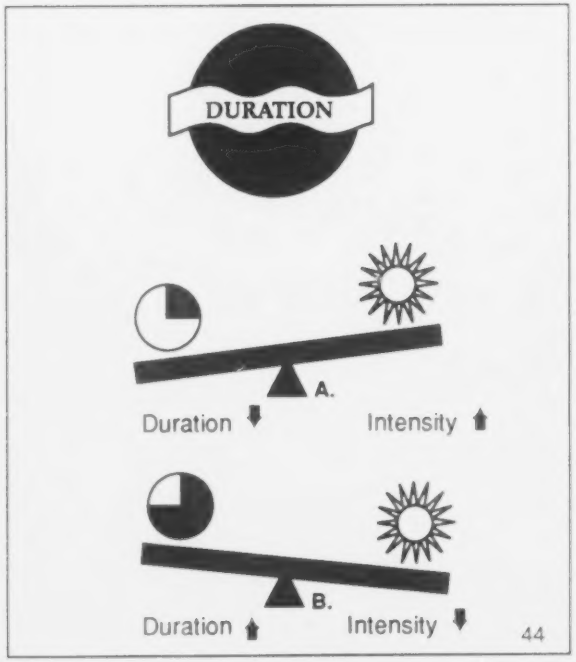
1) Determine HRmax: Scientists have found that HRmax values are related to age. As one gets older, HRmax declines. This decline is fairly consistent and thus a fairly accurate estimation of HRmax can be determined with this formula: (HRmax = 220 - your age) Have students calculate their own HRmax.
2) Determine HRrest: The best way to get an accurate measure of HRrest is to take your pulse before arising from bed in the morning. However, this is not possible in a class situation, so we will use your resting pulse. Start the stop watch and have students count their pulse for one minute.
3) Determining HRtraining: Now that we have the HRmax and HRrest, let's put them into the equation to determine what your heart rate should be when you exercise.

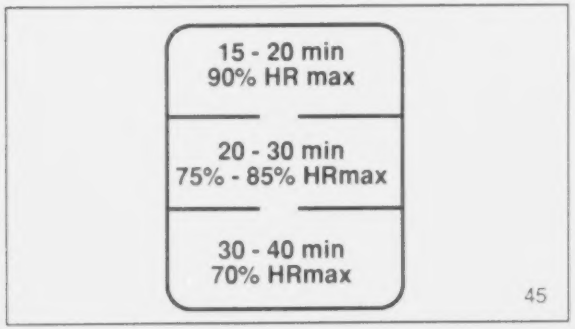
   HR training = (HRmax - HRrest) x (conditioning intensity) + HRrest
   (Go through the formula step by step, following the example below)

   Sara's numbers are:

   HRmax =208
   HRrest = 60

HRtraining =	70 %	= (208 - 60) (.70) + 60
		= 148 (.70) + 60
		= 164 beats/min
		= 27 beats/10 sec
	85 %	= (208 - 60) (.85) + 60
		= 186 beats/min
		= 31 beats/10 sec





4) Explain that based on the information from the example: Sara should be exercising hard enough to get her heart rate up between 164 and 186 beats per minute if she wants to improve the condition of her heart and lungs. So when Sara begins her exercise program, she should monitor her heart rate while she exercises to make sure that it stays within this range. Suppose Sara is running. After 10 minutes of running she stops and takes her pulse for 10 seconds. She counts 31 beats. What should she do? Should she go faster, go slower, or stop? She runs for 10 more minutes and stops to take another pulse. This time she counts 19 beats for 10 seconds. What should she do?

Duration

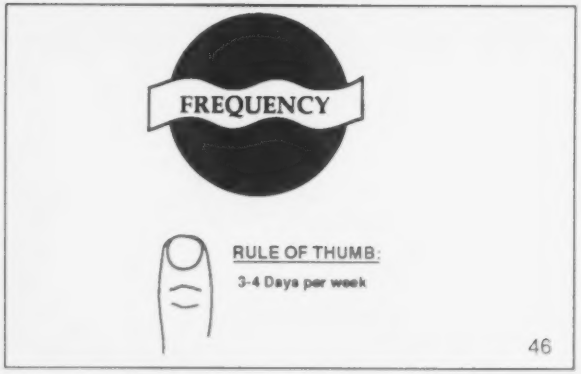
We now know that intensity is an important consideration in the development of a safe and effective exercise program. Another important question to ask is how *long* should one exercise? Is five minutes enough or is an hour necessary(#44)?

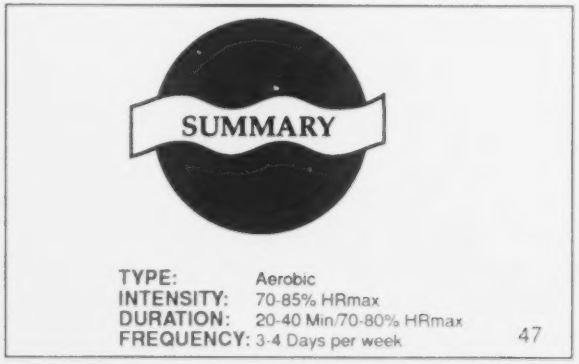
It is impossible to say that exercising for one set time period will apply to all fitness levels. How *long* you exercise depends on how *hard* you exercise. Suppose you are going to go for a bike ride. You would not have to exercise as long if you could bike in a place where you could go for a hard ride without stopping (say on a bike path or out in the country). (Refer to see-saw figure A on overhead #44). However, if you were to cycle around town where there were stop signs and traffic, you would need to go for a longer time in order to get the fitness benefits we have talked about (Refer to see-saw figure B on overhead #44). Therefore, it is really the *total* amount of work that you do rather than how long it takes you. You might be the type who likes to get in there and work hard to get it over with quickly, or you might be the type who likes to take it a little bit easier and not worry about time.

Here are some basic guidelines (#45):

15-20 min at 90 percent HRmax
20-30 min at 75-85 percent HRmax
30-40 min at 70 percent HRmax

If the exercise is: continuous, 20-40 minutes,
noncontinuous 40-60 minutes





Frequency

The final question to ask in developing a safe and effective exercise program is: "How *often* should I exercise?" (#46) Exercise scientists have experimented with different schedules. They found that the best way to improve your fitness level is to exercise three to four days per week. If you exercise less than that, such as one or two days, you would need to work so hard that it probably would be no fun and also might lead to some injuries. On the other hand, what if you exercised more than four days per week? People who do that do not improve the condition of their hearts and lungs that much more than those who run three or four times per week.

Summary (#47)

Type:
1. exercise utilizing large leg muscles.
2. requires stamina:
   a. continuous
   b. discontinuous (only if vigorous)

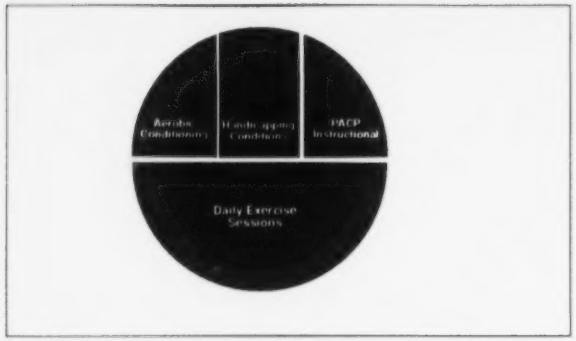
Intensity: 70% to 85% HRmax
Duration: 20 to 40 minutes at 70-80% HRmax
Frequency: 3-4 days per week

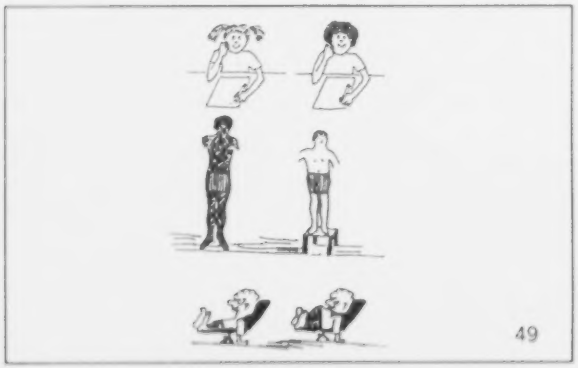
How can you build more aerobic activity into your lifestyle? Sometimes you can find a group to join. Maybe your school has sport programs, or maybe a friend would like to run, bike, or swim. Make a plan for yourself for this coming month. Set aside 30 minutes, three days a week. Some days you might run, some you might play soccer, others you might swim. Or, you might stick with one activity you really like. Check your resting and exercise pulse rate after a few months. See if there are any changes. Think about your heart and circulatory system, and remember the changes that occur inside. Think about your lungs and respiratory system - remember those changes too. Enjoy yourself and think about all the good things going on inside.

Unit Summary

Think again of the scenario with which we began (#1). You have just played so hard and so fast that you are panting and gasping for air and you feel your heart pounding so hard that you feel it in your brain. You should now have a better understanding of what's going on inside of you, and you understand why you are gasping for air and your heart is pounding so hard. But more importantly you should be convinced of the importance

of keeping your heart and lungs in good condition. Regular physical activity has a multitude of health-promoting effects, but it is so important to exercise safely and effectively. Try it! And keep in mind all the good things that will be happening inside.





HANDICAPPING CONDITIONS UNIT—DAILY LESSON PLANS

Since it is natural to be curious and a little afraid of things we do not understand, the daily lesson plans outlined below are designed to answer questions your students might have about physical and mental disabilities. The unit provides a brief history of how persons with disabilities have been treated and information about and simulations of various handicapping conditions. One activity suggested in this unit requires arranging for a person with a disability to visit your classroom (perhaps a university student, a parent, or a community member). Our staff found this to be a very positive experience for both the students and the guest; it provided a comfortable environment for an exchange of questions and concerns.

Attitudes

Individual Differences

ACTIVITY: INDIVIDUAL DIFFERENCES
From: Special Friends Program, Hawaii Integration Project, 1983.

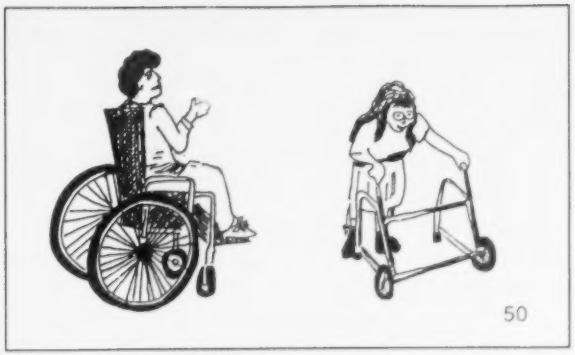
Equipment needed: Overhead #48 and projector.

Procedures:

1. Ask students to volunteer examples of how members of the class differ. Suggest that some of us have blue eyes, some of us have short curly hair, and some of us have allergies. Write the students' examples on overhead.
2. Review the list of examples and ask the students how certain examples might influence the way a person lives. For example, suggest that if a person has allergies, his/her work might be affected because he/she is feeling so poorly. Or, if a person loses or breaks his or her glasses, it might be difficult to see the board or to read.

What is Normal?

Some of us have blue eyes, some brown, some hazel; some of us have long, silky hair, while others have short, curly hair; some of us are tall, some short; some of us are



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overweight, some of us are thin; some of us have dark skin, some have light skin (#49). There are some of us who can run fast, while others are not as fast; there are those of us who sing well, and others who can barely carry a tune. Nobody finds it strange that we have these differences. In fact, these differences are interesting. They are the very things that make us unique. No one is shocked or amazed by them. It is only when these differences take on a more obvious form that people react (#50). It is only when we see a boy in a wheelchair who can't control his movements, or a girl with leg braces and crutches, or a boy using his hands to communicate that we make a big deal about it. These differences are so obvious that they become conspicuous.

When so-called "normal" people see big differences, they sometimes become curious and a little afraid. They might stare, tease, or make fun; others might completely ignore these people. Why do people react this way? A fear of the unknown, and some unfortunate myths about deformities and disabilities contribute to our reactions to these differences—it's natural to be curious and a little afraid of things we don't understand. It is the purpose of this unit to answer questions about physical and mental disabilities and to show you that the *similarities* between people with and without disabilities far outweigh the *differences*. It won't give an understanding of what having a disability is like, since no one can really know without experiencing it, but we will do some activities that will help you to understand.

Keep in mind that people are all different from one another. Differences may be more noticeable in some than others. That is all. The difference is just a matter of degree. A disability (a difference) requires a person to make extra effort or seek extra help but it *does not* make a person different in what she or he feels and needs.

Treatment Through History

Attitudes toward persons with disabilities have changed through the course of history (#51). The prevailing attitude however, has been one of rejection, and the person has been separated from society. This attitude is understandable in the earliest primitive cultures, because the survival of the tribe often depended on every member of the tribe doing his or her share of the work. The ability to hunt, fight, and gather food was a necessity. Those with disabilities were considered a burden and were simply abandoned.

As civilization progressed and people became more stable and secure, persons with disabilities were still looked upon with fear and revulsion. In ancient Greece and Rome, a child born with a deformity was immediately put to death. They were left on mountainsides, thrown in rivers, or allowed to die of neglect. There were few medical explanations for these differences, so many superstitions and religious explanations

were accepted. Some thought they were possessed by demons while others thought they were protected by the gods. While most were cast out and rejected, some cultures treated them as children who had been sent down by God for a divine purpose.

In the Middle Ages, a time that was not known for any kindness toward people, those with disabilities often became jesters in the courts of nobles or were burned as witches because they were thought to be possessed by an evil spirit.

The Renaissance, 1450-1600, saw a slight shift in attitude toward persons with disabilities. As the science of medicine flourished, interest focused on the physiological causes and the possible cures for different disabling conditions. No longer did everyone believe that the disabilities were caused by evil spirits, sin, or the devil.

A big change in attitude came in the early 1800s. Rather than having purely medical or clinical attitudes, people began to regard persons with disabilities with sympathy. However, despite this shift in attitude from one of revulsion to one of pity and sympathy, they were still separated from the mainstream of society and lived in asylums.

Even today, our attitudes toward persons with disabilities reflect history. There is still fear, disgust, confusion, superstition, and pity passed on from generations before us. However, attitudes are slowly beginning to change. Gradually, persons with disabilities are being given the opportunity to participate in activities with their nondisabled peers, and are functioning quite satisfactorily in the "normal" world.

Some significant laws have recently been passed. One in particular is called the "Bill of Rights" for children and youth with disabilities. It guarantees to all handicapped youth the right to the best and most appropriate education. The setting may be a regular classroom, a special classroom, a residential school, or a hospital; it is determined by school officials together with the children's parents.

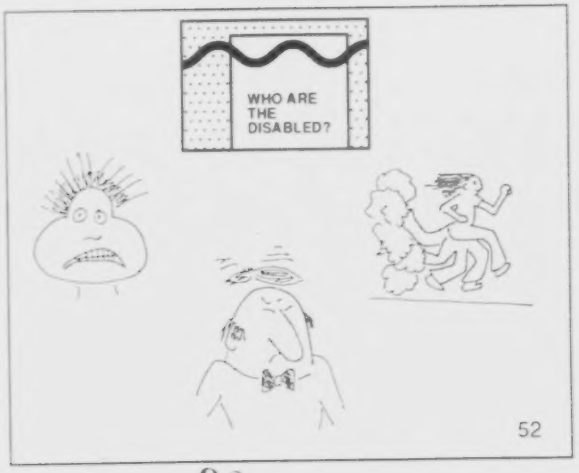
The new laws have established a legal basis for an improved situation for all persons with disabilities. Frequently, however, when a person has accepted his or her disability and has learned to deal with it in the most appropriate educational setting, it is not the disability itself that is the handicap but rather it is the confusion, anger, fear, pity, or disgust that it often arouses in others.

ACTIVITY: EVERYTHING YOU WANTED TO KNOW ABOUT DISABILITIES BUT WERE AFRAID TO ASK

Equipment needed: none

Procedures:

1. Explain: When persons with disabilities are interviewed to find out what they want nondisabled persons to know about being disabled, they often



say: "Tell them that we are doing fine and that we do not need their pity. Tell them they can ask questions and they do not need to be afraid. Tell them about the aids that help us do the things we want to do. Tell them not to have hurt feelings if we do not need their help. And one man said, tell them that we go to the bathroom too" (Kamien, 1979, p. 3). This may make you laugh, but what he was trying to say was that he is no better or worse than anyone else.

We are all a little curious and a little afraid of what it would be like to have a disability (physical or mental). But by sharing the facts about disabling conditions, and by trying to answer all those questions that you have had, perhaps you will be less afraid of meeting and befriending a person who has a disability.

2. Have each student write down on a sheet of paper any questions he or she might have about disabling conditions. Keep the responses anonymous.

Interview with a Person Who Has a Disability

Arrange for a person with a disability to visit the classroom. Interview the person before having them come to the class to determine what they feel comfortable discussing. Share some of the questions asked on the students' papers from the activity above.

Disabled/Handicapped: What Does It Mean?

Who are the disabled? We are all disabled in some way (#52). Many of us find it difficult to speak in front of a group; others find it difficult to run fast; still others of us have quick tempers that may get us into trouble. All of these are shortcomings—they affect the way we live but they do not prevent us from enjoying life. It is no different for people with disabilities. They have difficulties that prevent them from doing things that others their age can do. They may be missing a limb; they may not be able to hear or to see; they may lack the ability to control parts of their bodies, or they may have a more difficult time learning than their peers. However, they can function quite well with their limitations. Persons with disabilities are just like you and me. They have the same needs for friendship, understanding, and acceptance.

We are going to talk about different disabling conditions and try to simulate some of those disabilities. Some of the disabilities we will talk about are present at birth, others

may result from a growth problem, still others may result from a disease, serious illness or an accident. The millions of people who have disabilities include a cross-section of the population. They are young and old, black and white, rich and poor, male and female, and Christian and Jew. By learning about different disabling conditions, hopefully you will have a better understanding of what it is like to be disabled, and be less afraid of befriending someone who has a disability and less afraid of the prospect of having one yourself.

ACTIVITY: EXPERIENCING DISABILITIES

Equipment needed: See specific equipment for each activity.

Procedures:

1. Set up activity centers.
   a. Activity Center 1: Cerebral Palsy
      Equipment: masking tape; clothes with zippers, buttons, snaps, buckles; shoes
      Procedures:
      1. Wrap tape around fingers and thumbs of both hands.
      2. Try to get dressed using the available clothes.
      3. Time yourself, see how long it takes.

   b. Activity Center 2: Blindness
      Equipment: Blindfolds, containers filled with water, powdered drink mix (Tang), cups, spoons
      Procedures:
      1. Cover eyes with blindfold
      2. Pour a cup of water from the container
      3. Add a spoonful of powdered drink mix
      4. Stir and drink
      5. Throw cup in trash can

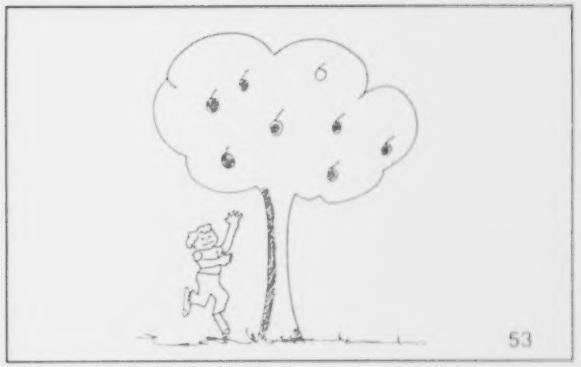
   c. Activity Center 3: Physical Disability
      Equipment: wheelchair(s), walker(s), and/or crutches; materials for obstacle course (i.e., desks, chairs, wastebasket, pile of notebooks)
      Procedures:
      1. Prior to the session: Create a typical "classroom maze."

Move the desks out of alignment, stack books on the floor, and make narrow typical passageways.

2. At the session:
   a. Crumble a piece of scrap paper.
   b. Move through the "classroom maze" using a wheelchair, walker, and/or crutches.
   c. Throw the paper into the trash can.

d. Activity Center 4: Mental Disability
Equipment: Coded poem or story, pencil
Procedures:
1. Prior to the session: Select a short poem or story. "Code" it by substituting numbers or symbols for the letters used.
2. At the session:
   a. Give each student a coded poem or story and give them time to "read" it.
   b. Then say "Now, please write the answers to the following questions on the back of the paper."
   c. Ask specific questions about the poem or story selected.

2. Ask students if they have ever experienced a temporary disability (a broken leg, a sprained ankle, broken glasses). Ask them to try to remember the most troublesome experiences they had during that time.
3. Explain: You are now going to experience in some small way what it feels like to live with a disability. Keep in mind that no one can really know what it is like without experiencing it but hopefully the activities you are about to do will help give you some idea.
4. Divide the class into groups. Have each member of the group select a partner. Assign each group an activity center.
5. Have each group complete all activity centers.
6. After every group has sampled each activity center, have a discussion about their feelings while they were experiencing the different disabling conditions. Ask them how it made them feel and how it would be different if it were a disability for 24 hours a day vs. several minutes.



ACTIVITY: WHAT IS A PROSTHESIS?

From: Special Friends Program, Hawaii, Integration Project, 1983.

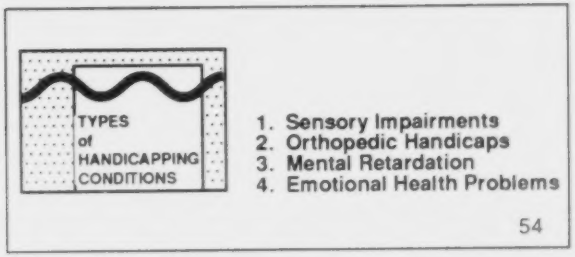
Equipment needed: Overhead #53 and projector; various prostheses (wheelchair, headgear, braces, hearing aid)

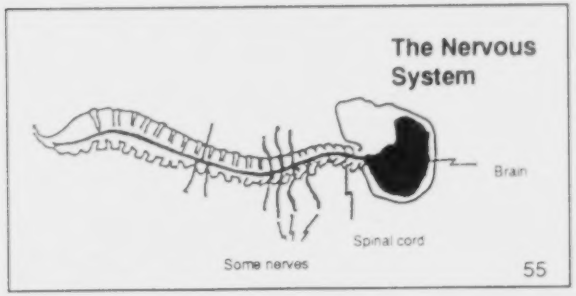
Procedures:

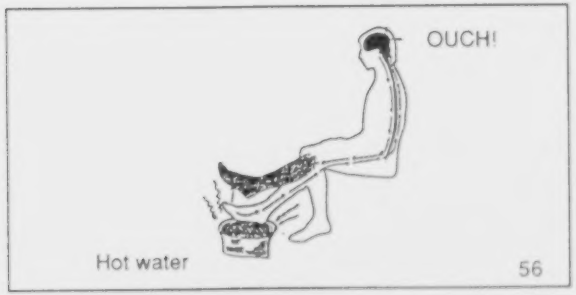
1. Put the picture of the boy and the apples on the projector.
2. Ask the students: What is happening in the picture? (Wait for responses). Yes, the boy is reaching for the apples but they are too high in the tree. How could he reach them? (Write the responses on the board grouping them into two categories: a) using "human" skills (climbing, jumping, etc.) or b) using tools (ladder, stick, etc.). Think about your answers. In this list (point to "human skills") you have named things the boy could do all by himself without any help at all. The solution to getting the apples would depend on whether he was strong enough to climb the tree or whether he could jump high enough to reach them.

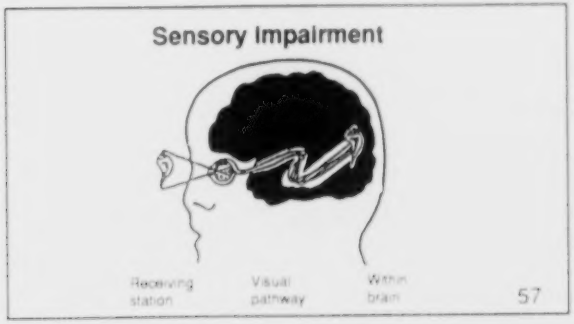
   In this list (point to tools) you have named tools that could help the boy reach the apples. The solution, in this case, would depend on whether or not the boy had the right tool to do the job.

   Write the word "prosthesis" on the board. Explain: A prosthesis is a tool a person with disabilities needs in order to do something. Without a prosthesis, that person may have a lot of trouble doing something or might not be able to do it at all.
3. Show some prostheses and ask students to guess how these tools could be helpful. If possible, set these tools at various places in the classroom to allow students a chance to handle them during their "free" time. If examples of prostheses cannot be located, use overhead example #69.
4. Explain: We are going to be talking about various disabling conditions. As we talk about each one, we will also look at some of the tools, or prostheses, available to a person with that particular disability. So, as we discuss different disabilities, be thinking about what kind of tool you think might help a person do the things they want to do.









Types of Handicapping Conditions

We are going to be talking about different types of disabling conditions (#54). We will discuss an example of each of the following conditions: Sensory Impairments, Orthopedic Handicaps, Mental Retardation, and Autism. As we discuss each disability, I want you to keep in mind what we have already discussed—namely, we are all different from one another. One's difference may be more noticeable than another's. That is all. The difference is just a matter of degree.

The human nervous system is made up of the brain, the spinal cord, and an intricate network of nerves that reach throughout the entire body. Let's see how it works (#55). Each time you see, hear, feel, taste, or smell something, a message goes out from your sense organs. The messages are carried by the nerves in the form of very tiny electrical impulses *to* your brain. Your brain then interprets the nerve impulses and gives meaning to what you are seeing or hearing or feeling or tasting or smelling.

Messages *from* the brain to other parts of your body are also carried by the nerves. The messages tell you to sneeze, move, talk, take a breath, or make your heart beat.

Let's look at a specific example (#56). Suppose you just hurt your foot and you must soak it in hot water. You sit down and put your foot into the basin of hot water. Your skin touches the hot water, and the sense organs in the skin are stimulated by the temperature and produce a signal. This is passed along the nerve fibers of the brain. The brain examines these signals and determines it is too hot. The brain produces more signals that are again passed along the nerve fibers back down to the leg. The foot is lifted quickly out of the water.

When the brain and nerves are healthy, the body functions normally. But, if there is an injury or damage to them, this complex communication system will break down and result in some type of dysfunction.

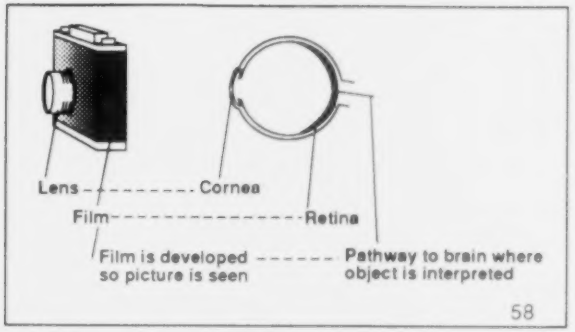
Sensory Impairments

Introduction to Blindness

Your eyes are receiving stations that pick up messages from outside (#57). Your eyes take in light and images of things and people. They translate these messages into nerve impulses. These impulses travel along pathways to the brain where they are interpreted into meaningful messages. It is your brain that helps you to actually recognize different people, to see flowers, and in general, differentiate all that is going on around you.

Sometimes something goes wrong along these amazing networks. The trouble

might be at the receiving stations, or along the pathways to the brain, or even something in the brain itself. When something goes wrong, you lose some awareness of what is going on around you. Let's first look at what happens when something goes wrong within the visual pathway.



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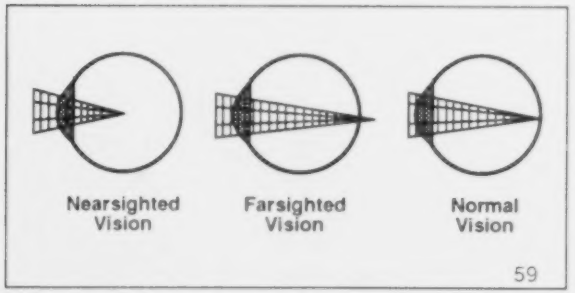
How the eye works

Let's start by taking a look at the eyes to see how they are supposed to work, and then look at the different problems that might occur.

The eye is often compared to a camera (#58). Light enters the eye through the cornea, which is like a lens. It focuses the image on the back of the eye or retina, which is like the film. The optic nerve then takes these messages from the retina to the brain. It is in the brain that the message is interpreted (the image you see—say it is a flower—is interpreted as a flower), just as film is developed so the picture is seen.

Visual impairments

The eye is far more complicated than any camera—therefore a lot more can go wrong. There are many conditions, diseases, or accidents that can damage all or part of the eye, and can cause visual impairments of varying degrees. Let's take a look at some visual disabilities—some that are less severe and are experienced by a great number of people, and some that are more severe.



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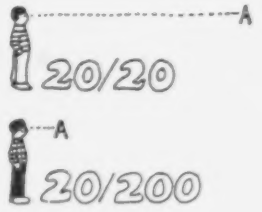
The most common visual problems are nearsightedness and farsightedness (#59). A nearsighted person sees close objects clearly. A farsighted person would see just the opposite, objects in the foreground would appear fuzzy, but objects in the background would be seen clearly. These problems occur due to differences in the shape of the eyeball.

When the eyeball is too long, light focuses in front of the retina and the person is nearsighted. When the eyeball is too short, light focuses in back of the retina; the person is farsighted. Near and farsightedness are easily corrected with the use of glasses or contact lenses. What these do is help the cornea focus the light right on the retina—not in front or behind it.

Another visual disability is caused by a disease called glaucoma. Glaucoma is caused by a build up of pressure from the fluid inside your eye. It is the most common eye *disease*. Typically there is a loss of sight in the center of the visual field. The danger of glaucoma is that as the pressure increases, there will be damage to the cornea. This could eventually lead to blindness.

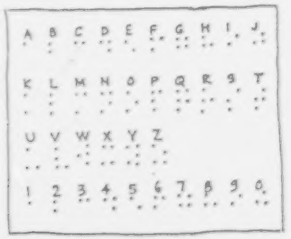
Many people have less than average eyesight. Wearing glasses or contact lenses is not a big deal—but what about those people whose eyesight is so poor that glasses may only help a little or not at all? To get an idea of how things might look to someone



From Kalem, J. *What if You Couldn't . . .* 60

Regular print books are often printed in a type this size.

Large print books are often printed in a type this size.



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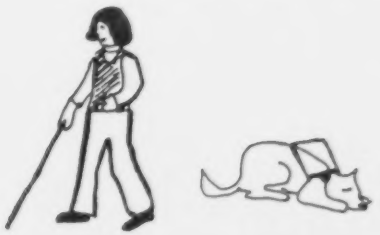

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who is legally blind, look at this.

Note we said "legally blind." What does that mean? Let's find out (#60). Everybody's heard the phrase "20/20 vision," but you probably don't know what it means. 20/20 is a way to talk about average eyesight. It means that you can see something from 20 feet the way the average eye is supposed to see it. A person who is labeled "legally blind" has 20/200 vision rather than 20/20. That means she or he sees something at 20 feet that an average eye would see at 200 feet (If possible, mark off 20 feet in your classroom and give students an idea of how much further 200 feet would be).

Many people think that blindness is the worst disability to have. It frightens them. They're afraid of being in the dark all the time—they enjoy seeing beautiful sights and colors, watching TV, and seeing what they themselves and their friends look like. Although a vision impairment would certainly cause you to live differently, it certainly isn't as devastating as many sighted people might think. There is no automatic compensation for lack of vision—there is no "sixth sense" about things. People who are blind do not hear better or have a better sense of smell to compensate for their disability. But they do *learn* to make greater use of the sensory clues in their environment. Things that a sighted person ignores, a person with a visual impairment pays closer attention to.

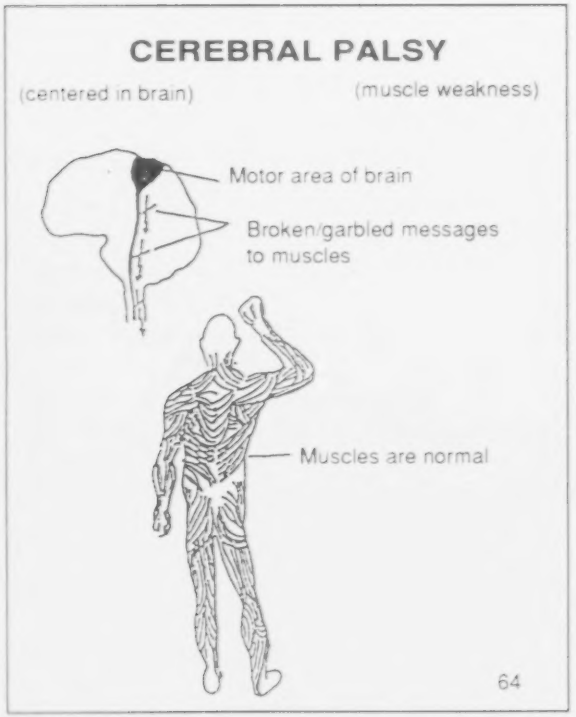
They *train* themselves to be more attentive to sound and touch. When getting around the house, for example, a tile floor in the kitchen makes a different sound and has a different feel than the carpeting in the living room or the wood floor in the bedroom. It is not the number of senses that count, but the way in which they are used.

Visual aids

People who have problems with their eyesight that glasses can't entirely correct may use other aids. Those who have partial loss of vision can sometimes read books with large type (#61). The only way that people who are blind can read, however, is when the material is printed in braille. Braille is a code based on touching raised dots. Each pattern of raised dots represents a letter or number. Once people learn the code, they can read anything printed in braille by moving their fingers across the page.

There are also new computerized reading machines to help persons with visual disabilities. One machine takes a page of a book, newspaper, or magazine, and puts it on a TV screen much larger and brighter than the original. Another device takes the printed page and instantly prints it in braille.

What about getting around? How does a person who cannot see get from one place to another (#62)? Learning to get around is called orientation and mobility training. In learning mobility, you start by feeling. You protect yourself by holding your arms in front of your body. One arm protects your face and chest; the other protects your stomach and thighs. This method is usually for little kids. When you get older, you learn



to use a cane or a dog. You memorize where things are, especially at home and at school. It requires concentration and attention all the time. You must, however, still know how to get where you are going whenever you go to a new place. Neither the cane nor the dog can take you there.

Obviously, even with the aids and skills we have been talking about, there are still some things you just couldn't do if you were blind. But people who are blind are increasingly able to enjoy and take part in a wide range of hobbies, recreational activities, and educational programs.

Orthopedic Disabilities

Introduction

You have probably seen people move around with the help of a wheelchair, braces, walkers, or crutches (#63). People need to use these aids for a lot of different reasons. Usually, their legs or arms are paralyzed or are very weak, or they are unable to control their leg or arm movements. There are a number of different kinds of *orthopedic* disabilities. What they all have in common is a physical condition that makes it difficult or impossible for the person to move his or her body in the normal way. The most common physical problems affecting movement are paralysis, amputation, diseases of the nerves, muscles, or bones, and brain damage.

Brain and nerve disorder: Cerebral Palsy

David is a kindergartner in a local school. He has trouble keeping up with most of the children in his class. He has trouble controlling the movements in his arms and legs. When it's time to fingerpaint, most of the paint is on his arms and elbows, and when it's time to do puzzles, he has trouble putting the small pieces into place. When David talks, it is very difficult to understand what he is saying, because his speech is badly slurred. But, in some ways, David does better than his peers. He is able to understand the meaning of a story better than most of the other students, and he has an unbelievably good memory. David has cerebral palsy (#64). Cerebral means centered in the brain and palsy means paralysis or muscle weakness. In the case of cerebral palsy, there is damage to the brain or nervous system, which results in incomplete or garbled messages going from the brain to the muscles. In mild cases, the muscles may be only slightly weakened and lacking in control. In severe cases, the person may be slightly or completely paralyzed. Also, there may be problems associated with intellectual development. About 60 to 70 percent of all children with cerebral palsy also have mental retardation. Even when cerebral palsy is not severe, it can alter the muscles around the mouth so that a person who is thinking clearly may have difficulty speaking and being understood.

Cerebral palsy is not inherited, and it can't be caught from someone else like a cold or flu. Rather, it is caused by injury or damage to the brain. This can happen before birth (e.g., mother has German measles or x-rays during the early months of pregnancy, mother is diabetic, or she has a different blood type than the fetus) or after birth (e.g., injury to the head, auto accidents, infections). About one out of every 200 babies born in the United States has cerebral palsy, making it the most common birth defect and one of the most widespread cripplers of children.

Cerebral palsy doesn't get worse as the person gets older, but there is no cure. Unlike other organs in your body, the brain, spinal cord, and nervous system can't repair themselves nor can a doctor repair them. The chief treatment is physical therapy, which helps to strengthen weak muscles and prevent unused ones from deteriorating.

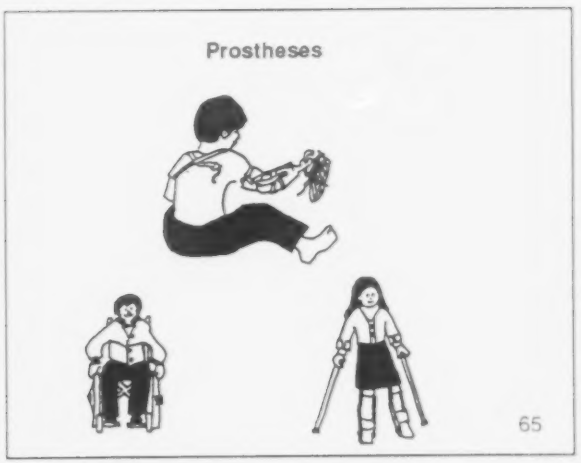
People with mild cases of cerebral palsy can lead very normal lives, no different than yours or mine. Others, however, may need so much help that they must be confined to special settings.

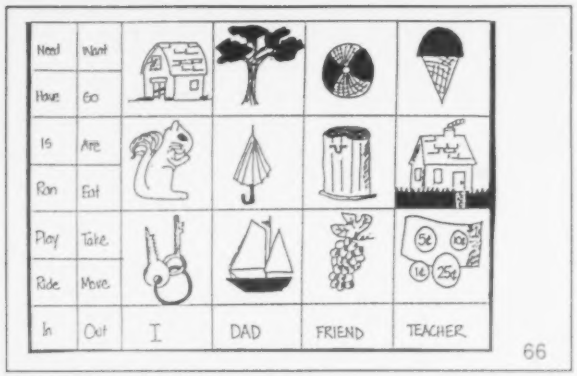
Cerebral palsy is only one type of orthopedic disability. With cerebral palsy, the problem lies in the brain's inability to control the muscles; the muscles themselves and the nerves connecting them to the spinal cord are perfectly normal. There are other orthopedic handicaps, some involve diseases of the nerves (such as multiple sclerosis), others involve damage to the brain itself, and still others involve permanent impairment of the bones and ligaments.

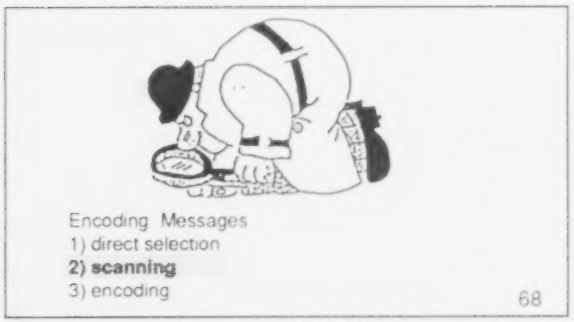
Orthopedic Aids

Special equipment can be used to enable a person with cerebral palsy or some other kind of orthopedic disability to function more normally in the classroom or at home. Let's think about some kinds of useful equipment for a minute. If you had been born without an arm or a leg, or lost a limb through an accident you would probably get an artificial limb called a prosthesis (#65). Prostheses are custommade for individuals to replace missing arms, hands, legs, or feet. For example, let's take a look at a prosthetic arm. A prosthetic arm must be able to reproduce the activities of the moving hand, which has a variety of complex movements. The prosthesis usually has a double hook at the end. The hooks are hinged together, and the user can open and close them by means of a wire attached to a shoulder strap. When the person moves his or her shoulder, tension is applied to the wire, which opens the hook for grasping and holding things. Working these devices takes a lot of practice. But those who have learned to use them can achieve very fine control of movement. Braces, wheelchairs, crutches, and special walkers are also available to help a person with orthopedic disabilities stand and walk.

Some children with cerebral palsy have difficulty talking because the muscles around their mouth have been affected. The child is thinking clearly but has difficulty







being understood. Can you think of some techniques that could be used by this child to communicate his or her message? (List responses on the board). A great many different techniques have been developed that can provide a non-vocal child a means of communicating. Let's try a few of them.

ACTIVITY: ENCODING MESSAGES

Equipment needed: Picture boards and messages (see Appendix A) for direct selection and scanning, overhead projector and overheads #66, #67, and #68.

Procedures:

1. Explain: There are three basic approaches to nonverbal communication. We will briefly talk about two of them and try them out.

   The first approach is *direct selection* (#67). This approach is the most straightforward and the simplest. This method merely requires the child to point directly to an object to convey the message. Suppose a child is thirsty, with direct selection, he or she would point to a glass. Another example would be the use of a picture board where the child points to a message. Let's see if you can communicate using a picture board.

2. Have students divide up into pairs. Hand out a communication board and a message to one member of each dyad.

3. One member of the dyad should read the message and try to communicate the message to the other member using the communication board.

4. Ask the students how they feel. Would you want to "talk" like this all the time? How would your daily life be different if you had to communicate this way (talking on the phone, playing baseball)?

5. Pass out another message and allow the second member of the pair to try it (If time allows, have students make up their own messages and see if they can communicate them using the communication board).

6. Explain: Another approach to non-verbal communication is called *scanning* (#68). This is a bit different from the direct selection approach. In scanning, pictures, words, letters, or symbols are presented to the child

one at a time so that he or she can make some kind of response (blinking, nodding, etc.) to indicate the desired message. Say, for example, a student who couldn't talk wanted to tell you something. If you were to use the technique called scanning, you would use your finger and slowly present the choices one at a time to the student by moving your fingers slowly across the board. The student would blink or nod whenever you were pointing to the message he or she was trying to convey. Try it and see what it feels like.

7. Have students regroup into the same pairs. They should use the same communication boards. Pass out another message to one member of the dyad.

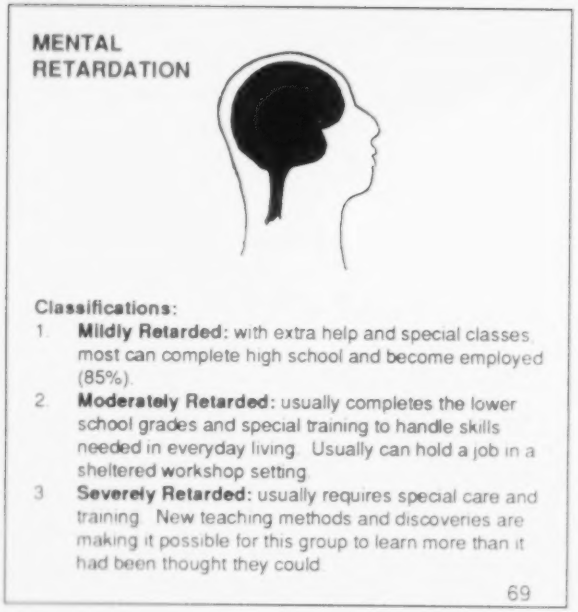
8. Explain: The person who has the message should read it—you are now the student who *cannot* talk. The person with the communication board is the student who *can* talk. Let me first talk to the people with the communication board. Your job is to slowly move your fingers across the communication board (in other words *scan* the communication board) and watch for your teammate to indicate when you are pointing to the part of the message he or she is trying to communicate. The job of the person with the message is to *blink* when your teammate points to the part of the message you are trying to communicate.

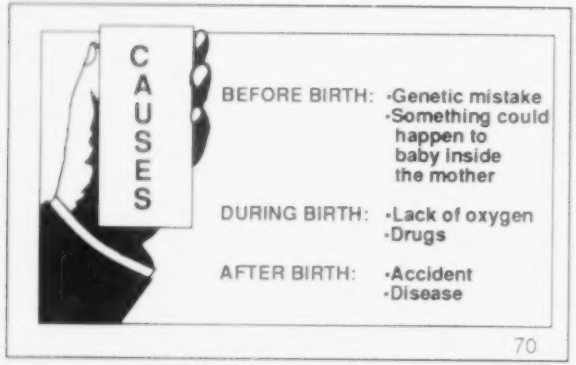
9. When the students have completed the message ask: How do you feel? What are some of the problems with this method? Explain: Because every part of the message needs to be scanned until the student acknowledges the desired message, this technique is very slow and it requires the constant attention of the message receiver.

10. Conclusion: These are the most basic approaches to non-verbal communication techniques. More advanced techniques, using computers and other machines, have helped to speed up some of these methods.

Summary

Most people with orthopedic disabilities can lead very normal lives. A person who must use a prosthesis or a wheelchair might still go to college, play certain sports, hold a job, get married and raise a family. For others, their disability may be more severe. It


MENTAL
RETARDATION
Classifications:
1. Mildly Retarded: with extra help and special classes most can complete high school and become employed (85%).
2. Moderately Retarded: usually completes the lower school grades and special training to handle skills needed in everyday living. Usually can hold a job in a sheltered workshop setting.
3. Severely Retarded: usually requires special care and training. New teaching methods and discoveries are making it possible for this group to learn more than it had been thought they could.
69



is only the *amount of inconvenience* that the disability causes that makes their lives different from ours. The person is *handicapped* in doing certain activities, but that doesn't mean *unable* to do them.

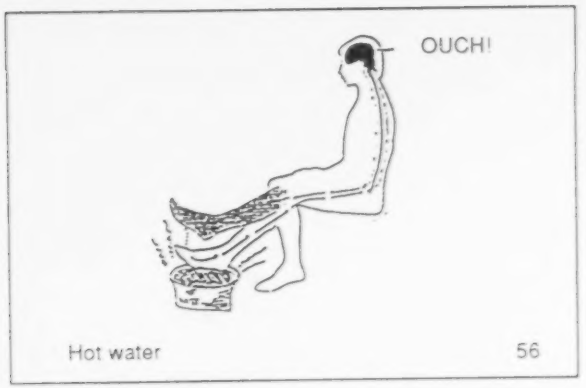
Mental Retardation

Some people don't learn as fast as the average person. Sometimes the difference in how fast a person is learning and how fast most other people the same age are learning is very small and other times it is very noticeable. The words most often used to describe persons who take much longer than average time to learn something are "mentally retarded (#69)."

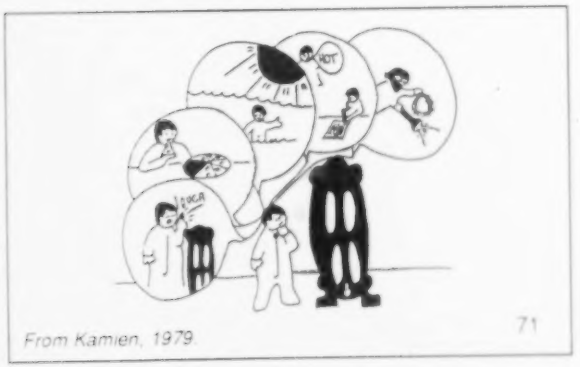
The degree to which a person can have mental retardation varies quite a bit. There are three major classifications: 1) mildly retarded; 2) moderately retarded; and 3) severely or profoundly retarded. The majority of all persons with retardation (about 85 percent) are labeled *mildly retarded*, which means that with extra help and special classes, most of them can complete high school and become employed. A person with *moderate retardation* usually completes the lower school grades and receives special training that enables him or her to handle the skills needed in everyday living. They can usually hold a job in either a competitive or a sheltered setting. A person with *severe retardation* usually requires special care. However, new teaching methods and discoveries are making it possible for them to learn more than it was previously thought they could, and even supervised independent living arrangements and employment options are becoming a reality.

Causes

There are a number of causes of mental retardation, and not many of them are well understood (#70). Most of the time, a person who is retarded has been retarded from birth. This could happen in a number of different ways: it could be a genetic mistake, or something could happen to the baby inside the mother before being born. Sometimes, if a mother gets a disease such as German measles while she is pregnant, it can cause retardation of the baby (Since this was discovered, there is a vaccination the mother can take before her pregnancy to avoid contracting the disease). Occasionally, retardation occurs during the birthing process due to a lack of oxygen. In any case, something prevents the baby's brain from developing normally, or damages the brain sufficiently to cause retardation.



Hot water 56



From Kamien, 1979. 71

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Learning Process

Damage to the brain, no matter what degree, can seriously affect learning. Remember we talked about the nervous system—the brain, the spinal cord, and the network of nerves that carry messages from the sense organs (skin, eyes, ears, nose, etc.) through the spinal cord to the brain (Refer to overhead #56). We said that damage at any point along the path can have drastic effects on how the body works. Mental retardation may cause the information that comes to you from your senses to be muddled and confused, so that it may take longer than normal to make sense of the information being brought to the brain (#56). Or, it may cause memory to be poor so that things you have just learned are forgotten. Or, perhaps, you learn something and remember it, but can't apply it to similar yet different situations. For example, you learn that a tea pot is hot but don't realize a frying pan is hot.

Before we talk about the learning *problems* that a person with mild, moderate, or severe retardation might have, let's find out how we all learn. You probably don't remember how you learned all the things that you know. Think about some little kids you know. What ways do they use to learn new things (#71)? They experiment; they also imitate other kids and adults. Let's think about it. When you were little, everyone would say "Don't touch that, it's *hot*." You learned the word "hot" but you really didn't *know* what "hot" meant until you touched it (trial-and-error). Then, what about the "hot" that is spicy, like hot peppers on pizza. And, what about the "hot" that means it's so "hot" outside that you should jump in the swimming pool to cool off. And, there are even more things you have learned about the concept of "hot." You know how to write, spell, and read the word "hot" and you probably know the saying "You're 'hot' stuff" or "Those are 'hot' goods." This process has taken you many years and a lot of learning. Even though the idea of being hot is very simple— there are a number of things you had to learn to get all the meanings of hot (Kamien, 1979).

No one fully understands how everything works, but we do know that the brain controls the learning process. It sorts and interprets all the information brought in by the sense organs and then sends messages via the nerves to all parts of your body. The messages allow you to respond verbally, intellectually, physically, and emotionally. The brain also stores old information (past experiences, memories) and links them to new situations.

Mental retardation and the learning process

What would happen to this learning process if you were retarded? Well, you could still learn—that's for sure. But, you may learn more slowly than other people. The speed and amount you would learn would depend on the severity of your retardation and on other things that learning depends on: your experiences and encouragement from other people.

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From Kamien, 1979 72

The key to your learning would be the need to have things broken down into small steps. All of us learn new skills and ideas this way, however, for you the steps would have to be very small at first and they might have to be repeated over and over.

ACTIVITY: BREAKING IT INTO SMALL STEPS

Equipment needed: Phone book/address book, overhead projector, and overhead #72

Procedures:

1. Explain: Have you ever really thought about all the things you know in order to complete a simple task? For example, let's take a look at the simple task of making a phone call. Let's see all the skills you need to call someone on the phone.

2. Ask for one volunteer to come to the front of the class to make a phone call (Select a volunteer). Have the student call (select a name from the local phone book/ address book) to find out whether or not he/she is going to the football game on Saturday.

3. As the student is locating the telephone number, ask the rest of the class to look for the skills needed to do this simple task.

   a. As the student is looking for the telephone number ask "What skills is he/she using now?" (Wait for responses—reading skills, understanding of alphabetizing) (#72 A).

   b. As the student is dialing the number ask "What about now? What skills is he/she using now?" (Wait for responses—needs to remember or copy telephone number from book, manual dexterity to dial the number, and number/letter recognition) (#72 B).

   c. Tell the class and volunteer that there is a busy signal (The student needs to recognize a busy signal and know to hang up) (#72 C).

   d. Ask the volunteer to pick up the phone again. Now, let's say the phone is ringing and ringing and ringing. What does he/she need to know now? (Wait for responses— need to know how long to let the

phone ring before hanging up) (#72 D).

e. O.K. now, let's try it once more. The phone is ringing and someone answers "Hello." (Ask the volunteer to finish the phone call by asking the person called whether he/she is going to the game Saturday). After the student hangs up the phone, ask "What skills were used once someone answered?" (Wait for responses— needs to understand language and understand when the conversation has ended) (#72 E).

4. Summarize: Besides knowing all of this, other decisions were needed— is it too late or too early to call; do I know this person well enough to ask them the question?

Just think of all the skills we have named. All of these skills are needed to make what we think of as a very simple phone call. Imagine if you had a learning problem how much more difficult this simple task would become. Not only would you have to deal with the difficulty of learning the skills but, in addition, you might feel frustration and failure because you would see others doing it with such ease.

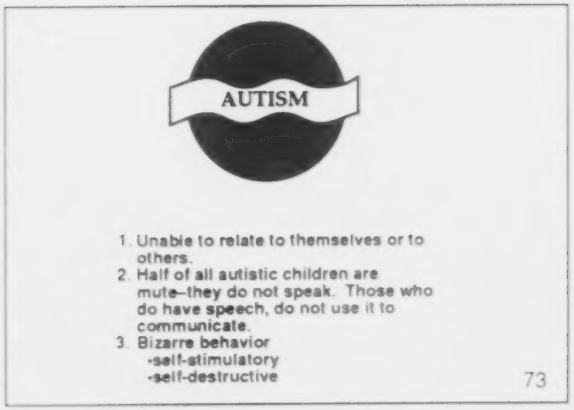
For a long time, most people thought a person with any degree of retardation couldn't learn much. Some people still have these beliefs. But this isn't true. Through extended work with children who have mental retardation, a more specific approach to teaching has evolved. This approach breaks down complex tasks into small steps and then these small steps are taught one by one. Hopefully, you have a better understanding of this learning process after going through the telephone sequence.

Conclusion

Mental retardation has been around for a long time. It has often been met with great misunderstanding—superstition and rejection. It is only recently that there have been great strides toward providing an education and other services for persons with mental retardation. Today they are being given more opportunities to live, learn, and work with everyone else. They are achieving higher levels of social, academic, and work skills than once thought possible.

Autism

There are thousands of children with autism in this country (#73). It is more common than blindness, and nearly as common as deafness in children—but I'll bet

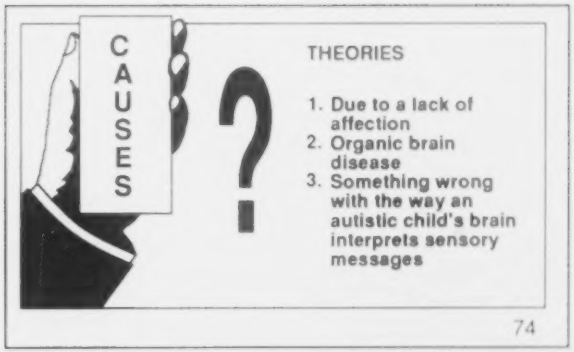

AUTISM
1. Unable to relate to themselves or to others.
2. Half of all autistic children are mute–they do not speak. Those who do have speech, do not use it to communicate.
3. Bizarre behavior
·self-stimulatory
·self-destructive
73

most of you have never heard of it. Perhaps the reason for this is that until recently the classification of autism did not exist. A man named Leo Kanner first described autism in 1943. Kanner had observed a number of children whose condition was very different from anything reported in the medical or psychological journals at that time. He was fascinated by these children's differences and wrote a paper describing these children. His paper is still very highly regarded.

Autistic children are described as being *unable to relate to themselves or to other people*. They are extremely "alone." Parents of children with autism often report that their child has always been "in a shell"; "happiest when left alone"; "acted as if people weren't there." It is interesting to note that the *average* infant "learns" during the first few months to adjust his (or her) body to the person holding him (or her). So, for example, if a father picks up his baby in her crib, she will normally extend her arms in anticipation of being held and then, once picked up, will naturally "conform" to the shape of his body. An infant with autism typically fails to extend her arms in preparation of being picked up and the father might have to even adjust the position of the infant to conform to his body. So, one outstanding characteristic of autism is a child's inability to relate in an ordinary way to people and situations. They may respond better to objects than they do to people.

Half of all autistic children are mute—they do not speak. Those who do have the power of speech often do not use it to communicate. Rather, they endlessly repeat words they have heard at some time or other, or they imitate in a meaningless way what others have said to them. For example, a boy named Robert would repeatedly say "Ah, do you care for a white pillow case, white pillow case, white pillow case?" He had heard a nurse at the treatment center saying this to another person while they were changing beds. He mimicked the sentence and repeated it endlessly in any number of inappropriate situations.

Children with autism often behave in unusual ways. They often engage in self-stimulatory behavior: that means they may make hundreds of ritualistic gestures during a day—they may rock back and forth, or flick their fingers over and over, or twist their hair around. Another bizarre characteristic of these children is self-destructive behavior. They may scratch, pinch, or even strike themselves. A boy named Danny hit himself on the ears with his fists, sometimes causing a great deal of swelling (For protection, he often had to have a football helmet strapped to his head).


CAUSES
?
THEORIES
1. Due to a lack of affection
2. Organic brain disease
3. Something wrong with the way an autistic child's brain interprets sensory messages
74

Causes

Believe it or not, despite these very dramatic behaviors, the causes of autism are unknown. Many different theories have been suggested, but we still don't know what causes it (#74). Some people have said that autism is due to a lack of affection from the parents, others feel it is due to an organic brain disease, still others feel there may be

something wrong with the way a child's brain interprets the different sensory messages it gets (remember the description of how the nervous system receives and senses messages). It is still unclear what causes autism.

Prognosis

The future of children with autism has been very poor. Only a small number attend special classes in a public school. Even fewer ever have a job when they grow up. Fortunately, however, educational and community services have improved over the last several years. Creative programming and research have opened up new pathways to allow children with autism to enter regular schools.

Impact on Family of Person with Disabilities

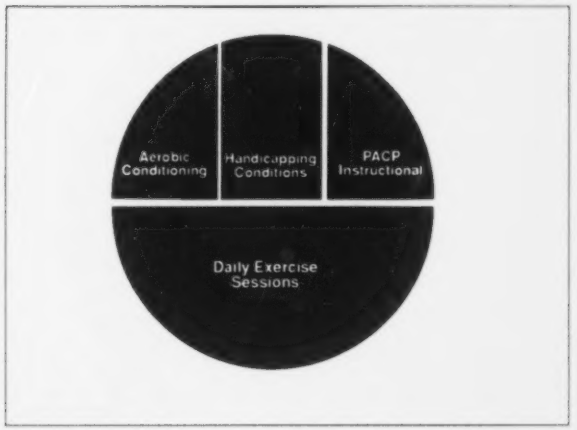
Even though we have come a long way since primitive times when persons with disabilities were put to death or cast from their families, there are still many misunderstandings about disabilities. In our society, there is a high premium placed on having a "normal" nonhandicapped child. Learning that one's child is disabled can be a very painful experience. Families with such children may experience more stress and frustration. They often feel shame, guilt, ambivalence, depression, or sorrow.

What the Future Holds

Predicting what will happen during the next few years with persons who are disabled is not easy. As we move into the future, new technologies will be developed and will create new opportunities for all people. Now, many people look at computers with awe and some fear. But in the future computers will probably be nothing special—just a familiar part of a person's daily life. Computers will be tailored to meet the needs of an individual—perhaps minimizing the differences between us all.

The future may be brighter in some ways, and darker in others. Due to scientific and medical advances, there will probably be fewer persons with disabilities, but there will always be people in our society who need special education and rehabilitation. An understanding and acceptance of these differences will be as necessary then as it is now. We must recognize them for what they are—not handicapped, but people.

"A story is told about two towns in which there was plenty of food but the people were not able to feed themselves because they could not bend their arms at the elbows. In one town, the people starved and died. But in the other town the people were well fed. The reason for the difference was that the people in the second town were feeding each other. In a society where people share and show compassion to one another, human disabilities become very unimportant" (Berger, p. 112).



PACP INSTRUCTIONAL UNIT–DAILY LESSON PLANS

After the nondisabled peers have completed the units on aerobic conditioning and handicapping conditions, they are ready to learn about their role in the PACP. This unit is designed to do just that. The PACP Instructional Unit details the role of the nondisabled students before, during, and after the exercise sessions. Through a series of activities, the students will be taken step by step through the routine of one daily exercise session. They will practice heart rate monitoring, motivational strategies, and data recording as they conduct their daily routines.

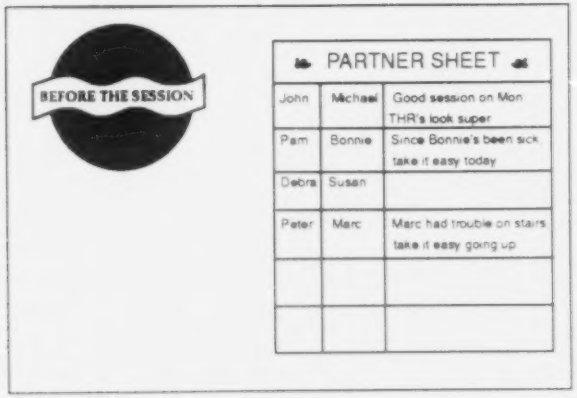
It should be noted that the routines described in this chapter may need to be altered for your unique situation. It is important that you practice the protocol appropriate for your setting. We also suggest that prior to any involvement in the PACP, the nondisabled peers be given the opportunity to observe the students with disabilities involved in the exercise program and talk with their teachers. This observation time could take place in the classrooms of the students with disabilities or if possible, in a physical education setting. No expectations should be placed on the nondisabled peers during this observation period. After the observation, a discussion between the nondisabled peers and the participating teachers is recommended.

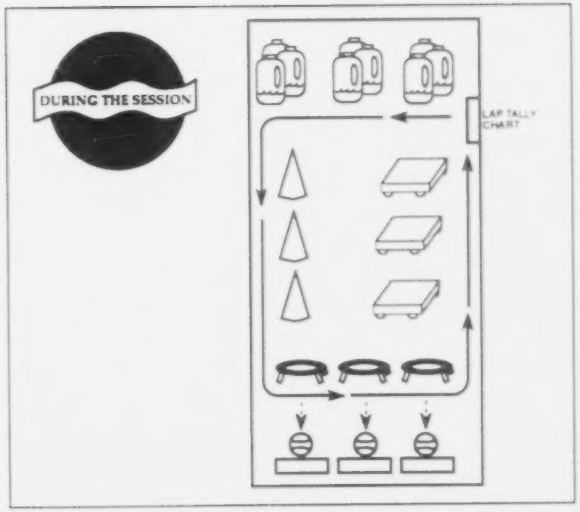
Introduction

You have learned about aerobic fitness and handicapping conditions. Now it is time to put together what we have learned . We are going to explain what your role in the program is and how important you are to its success.

For most of us, what we do during the course of the day doesn't provide the physical activity needed to maintain good health. So, it's necessary to incorporate regular exercise into the daily routine. This is even more true for persons with disabilities because the opportunity to exercise is not as available to them.

Remember, aerobic exercise strengthens the heart and lungs and requires keeping the heart rate up for 15-20 minutes. Thus, in the beginning of an exercise program, it can be difficult and often very uncomfortable. This is where you can help. Your role in this program will be to help make exercise more enjoyable for your partner—to tell him or her that he or she is doing a good job, to talk with them, to make the time fun. In addition, you will need to try to keep your partner's heart rate in the targeted range. You are very important to the success of this program; your encouragement and contact with your partner are crucial components. During the next few days, we will be finding out how to monitor the heart rate and more about the routine of the exercise sessions.


BEFORE THE SESSION
PARTNER SHEET
John Michael Good session on Mon THR's look super
Pam Bonnie Since Bonnie's been sick take it easy today
Debra Susan
Peter Marc Marc had trouble on stairs take it easy going up



Protocol for Daily Exercise Sessions

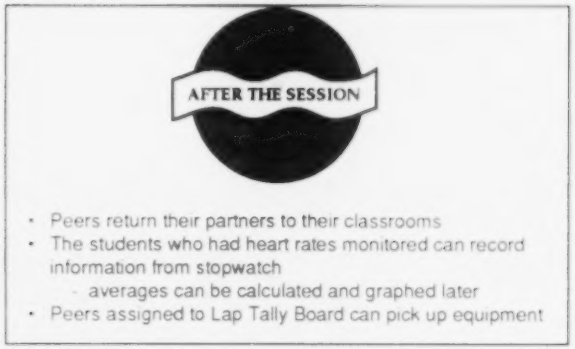
Before the Exercise Session

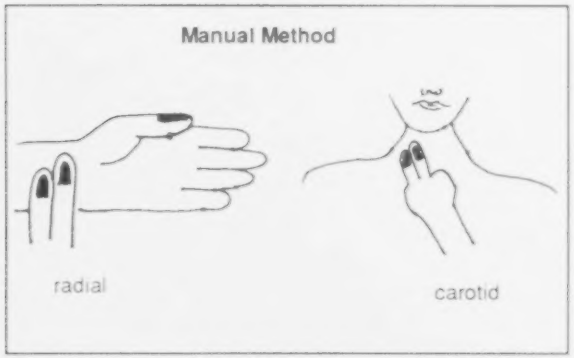
Before the exercise session, you will pick up your partners at their classrooms and bring them to the exercise setting. You will know who your partner is by looking at the assignment sheet on your classroom door (Hold up assignment sheet. See Appendix B). You can see on this sheet that there is a place for your names, a place for your partners' names, and a place for comments. The comments section will have helpful suggestions for the exercise session. When you get to your partner's room, you might want to ask the teacher how your partner's day has been going or how she or he is feeling.

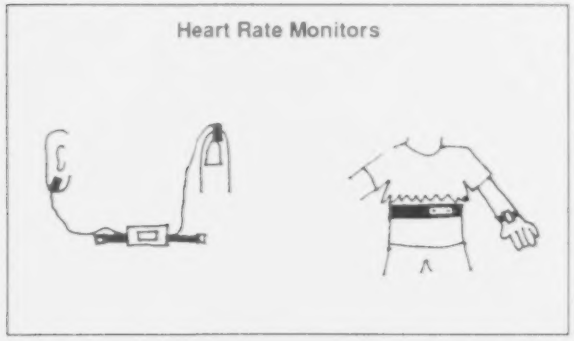
During the exercise session

When you come to the exercise session, you will take your partner to one of the activity stations set up around the room. You will stay at the center and do the exercise(s) with your partner until it is time for the aerobic portion to begin. When it is time to start exercising aerobically, music will start and you should walk/jog around the designated track. This portion of the exercise session may be difficult for both you and your partner—especially at the beginning when your body is not used to aerobic exercise. That is why it will be important for you to give encouragement throughout the session. When your partner is exercising, tell her that she is doing a good job, give her a pat on the back, smile, be excited. For additional motivation, we will have a lap chart to monitor the number of laps; quick tempo music will be played, and/or special activities will be planned (See motivational strategies in the Chapter 4).

During the daily exercise sessions, we will monitor heart rates to determine whether your partner is working at the appropriate level to improve her fitness level. Remember that keeping the heart rate up and keeping everyone moving is *very* important.


AFTER THE SESSION
• Peers return their partners to their classrooms
• The students who had heart rates monitored can record information from stopwatch
- averages can be calculated and graphed later
• Peers assigned to Lap Tally Board can pick up equipment





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After the Exercise Session

At the end of the aerobic session, you will record information from the session in your partner's folder. You will record the number of laps completed and the number of exercise minutes. We will see how this all works by practicing the routine, but before we do, let's learn how we can monitor our partner's heart rate.

ACTIVITY: GETTING THAT HEART RATE UP

Equipment Needed: Stopwatch or clock with second hand, heart rate monitor.

Procedures:

1. Explain: Remember, it is important to monitor one's heart rate during exercise because it gives us a good idea of exactly how hard the cardiovascular system is working. Let's learn how to do that today (Follow procedures for the Manual Method if you have not purchased a heart rate monitor. Follow procedures for the Heart Rate Monitor Method if you have purchased a Sporttester PE 3000).

2. A) The Manual Method
    1. Have your students locate their radial pulse using the tips of their index and middle fingers (See instructions in the PACP Manual for monitoring heart rate in Chapter 3).
    2. Once they have located their radial pulse, have them start counting the number of times they feel a beat once you say "Begin."
    3. Start the stopwatch and have the students count their pulse for six seconds. Have them add a "0" on to the number they counted. For example, if they counted 7, then their heart rate would be 70 beats per minute.
    4. Have students practice with a partner.

    B) The Heart Rate Monitor Method
    1. Explain: One way to measure your heart rate is to use a heart rate monitor (Show the students the monitor). A heart rate monitor works on the same principle as an ECG machine—it measures electricity from the heart. It has two electrodes that can pick up the heart's electricity (point to the electrodes). The information

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from the electrodes is displayed in the watch and tells you how fast the heart is beating. Now let's try it out. You need to know that this monitor was VERY expensive and it is important that you handle it very carefully.

2. Practice using the equipment following the instructions in PACP Manual.
3. Explain: Now that you have learned how to monitor heart rate, lets try out the entire exercise protocol; from the time you pick up your partner to the time the session is over.

ACTIVITY: READY...SET...GO!!!

Equipment Needed: Assignment sheet, folders and pencils, activity cards for stations, music, lap chart, Daily Workout Session record (see materials needed for exercise session in Appendices B and D).

Procedures:

1. Prepare the assignment sheet. Divide the group in half; half will serve as nonhandicapped peers and the other half will act as students with disabilities. Put the assignment sheet on the door of the gym.

2. Set up the activity centers and the equipment needed for the aerobic exercise session.

3. Have the nondisabled peers look at the assignment sheet, "pick up" their partners, and go to the activity centers.

4. After they have had some time to perform the exercise(s) at the activity center, STOP. As a group, go over the activities at each station and some of the problems that might arise at each of them. Ask for any questions.

5. Explain: Next comes the aerobic exercise portion. This is when you will walk/jog around the track with your partner giving them encouragement as you go. It is also the time when you will be monitoring their heart rate so let's practice that too (If a heart rate monitor is used, it should be placed on a target student).

   Begin the music and note the starting time. The pairs should walk or

jog around the track. Remind the nondisabled group to offer encouragement throughout the session.

NOTE: Please note several considerations that may vary with each individual setting:

1. Lap monitoring: if laps are to be monitored, the method should be explained and practiced during this period.

2. Heart rate monitoring:
   a. Manual Method: if the manual method is used: 1) all of the nondisabled peers could monitor the heart rates at certain times throughout the period (i.e., at certain times during the walk/jog portion a staff member could tell everyone "Stop for a heart rate check." The student pairs would stop, the nonhandicapped peers would locate their partners' pulse. The staff member would say, "Ready, begin" and the nondisabled participants would count the pulse beats until the staff member would say "stop") or 2) selected individuals could be targeted on any given day (i.e., at certain times during the walk/jog portion a staff member could tell the targeted student pair to stop and take a pulse using the same procedure as outlined above).
   b. Heart Rate Monitor Method: on any given day the heart rate monitor would be set for the target heart rate range of a particular student. The monitor would be placed on the student with disabilities and the nondisabled student would use the monitor to determine whether or not the walk/jog rate was at an appropriate level. If the pair was walking too fast or too slow, adjustments could be made.

3. It is helpful to maintain written records of each person's heart rate data. The information is valuable in establishing and maintaining an appropriate level of fitness and can also serve as a motivational tool (see motivational strategies, Chapter 4).

4. Special considerations:
   a. Any special reinforcement systems that might be used should be discussed at this time.
   b. Medical concerns: if any of the students have a medical history that might affect their exercise performance (seizures, medications), an explanation of procedures to follow is necessary. Role playing a problem of this nature might be useful during the practice session.

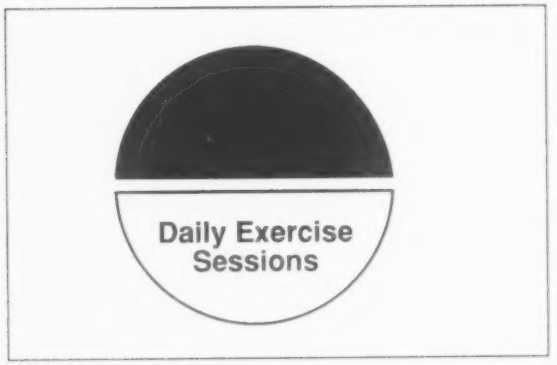
5. After the allotted time, call the students back into a discussion group. Ask them if they have any questions.

Explain: The walk/jog portion has now ended and it is time for you to record information in your partner's folder.

Have the nondisabled students pick up a folder and pencil. They should complete the "Daily Workout Session Record" data sheet in the folder. Answer any questions the students have about the completion of the data sheet.

Explain: Finally, you would put the folders back in the appropriate spot and then take your partners back to their classrooms.

Chapter 4
The Daily Exercise Sessions

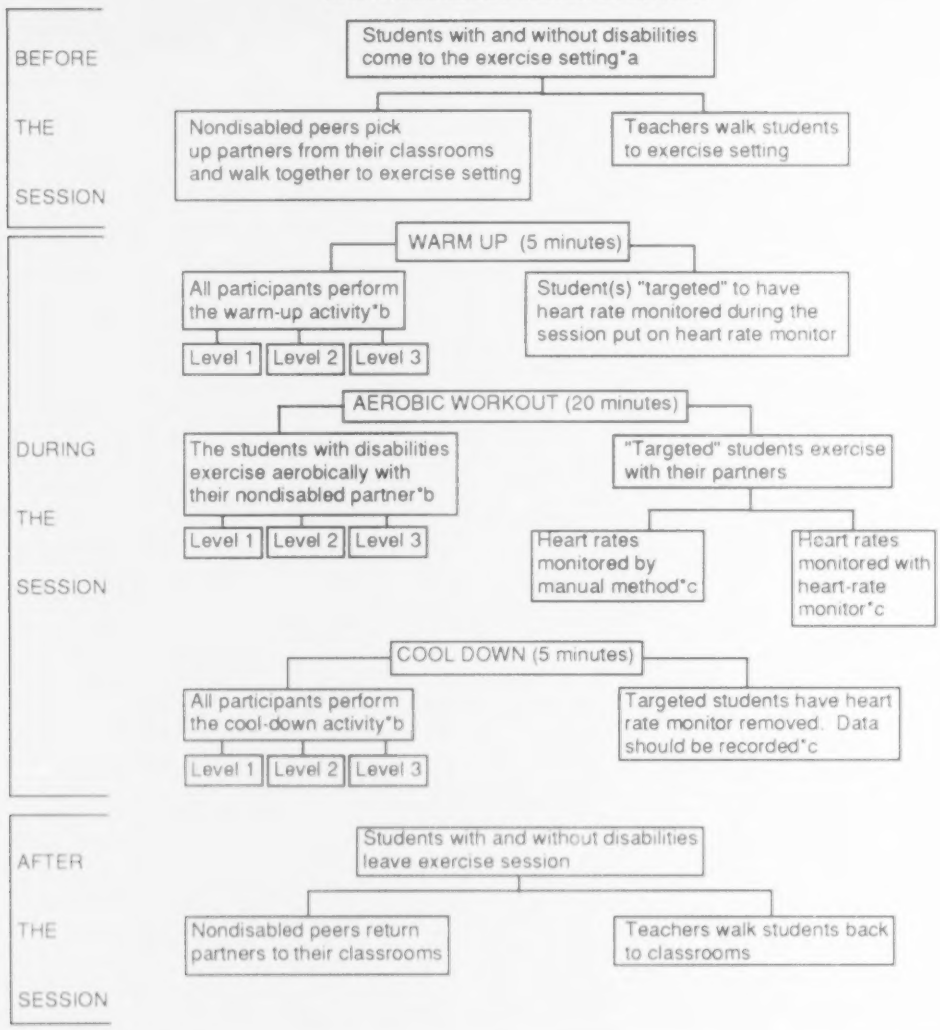


It's now time to consider *how* you can best organize the daily exercise sessions. Remember, the goal of each session is to safely and effectively stress the cardiovascular and respiratory systems to produce substantial improvements in *aerobic fitness*. However, as you know, getting in good aerobic shape takes time and work, and initially may even feel uncomfortable. Therefore, it is crucial to build fun activities into your fitness program and to evaluate them in terms of both effectiveness and enjoyment. This chapter outlines a variety of exercise protocols, evaluation tools, and motivational strategies useful in creating interesting, fun, and effective exercise sessions for all the participants in your program.

Protocol

One of the most important factors affecting the successful implementation of the PACP is the organization of the daily exercise sessions. Unfortunately, we cannot provide you with *one* best protocol, but we can provide you with a variety of choices, from which you can select the one that best meets the needs of the students and staff in your school. A protocol is an organizational plan that specifies the sequence of activities. In this section, a variety of ideas for the management of the PACP before, during, and after the exercise sessions will be presented. The flow chart on the next page provides an overview of procedures that can be used during the daily exercise sessions. The information on this chart is delineated in the remainder of this section, so as you read this section you can refer back to the flow chart.

DAILY EXERCISE SESSION OVERVIEW


BEFORE THE SESSION
Students with and without disabilities come to the exercise setting*a
Nondisabled peers pick up partners from their classrooms and walk together to exercise setting
Teachers walk students to exercise setting
DURING THE SESSION
WARM UP (5 minutes)
All participants perform the warm-up activity*b
Level 1
Level 2
Level 3
Student(s) "targeted" to have heart rate monitored during the session put on heart rate monitor
AEROBIC WORKOUT (20 minutes)
The students with disabilities exercise aerobically with their nondisabled partner*b
Level 1
Level 2
Level 3
"Targeted" students exercise with their partners
Heart rates monitored by manual method*c
Heart rates monitored with heart-rate monitor*c
COOL DOWN (5 minutes)
All participants perform the cool-down activity*b
Level 1
Level 2
Level 3
Targeted students have heart rate monitor removed. Data should be recorded*c
AFTER THE SESSION
Students with and without disabilities leave exercise session
Nondisabled peers return partners to their classrooms
Teachers walk students back to classrooms

* denotes material included in Appendices
*a refers to "Assignment Sheet"
*b refers to "Activities Packet"
*c refers to materials included in Evaluation (fitness section)

Before and After the Session

There are at least two organizational issues common to the *before* and *after* periods of the exercise session: 1) how will the students with and without disabilities get to and from the exercise session, and 2) who will be responsible for setting up and picking up the necessary equipment? The answers to these questions will be influenced by the students and teachers in your school. Here are some possible scenarios that might help you determine the best plan for your situation:

Getting the Students to and from the Exercise Session

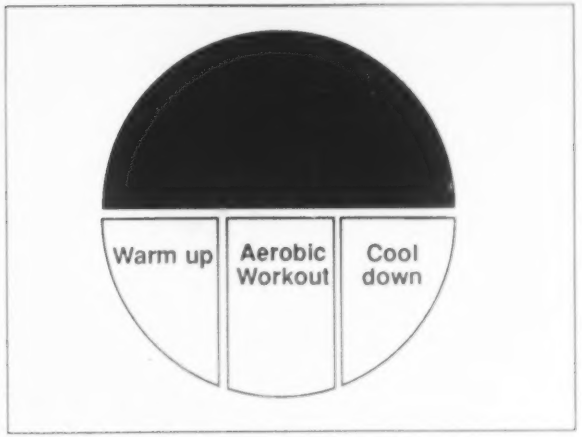
Scenario 1. Have the nondisabled peers pick up and return their partners with disabilities to their classrooms. By posting an "assignment sheet" (see Appendix B) on the door of the nondisabled peers' classroom, they find out who their partners are for the day. At the appropriate times, they can pick up and return their partners to their classrooms. This idea works well when only a portion of the students from the nondisabled classroom are to be involved in the program. In this way, the classroom teacher can remain in the classroom with his or her other students. It also provides an easy and friendly atmosphere for interaction to occur between the nondisabled students and their partners.

Scenario 2. Have the teachers of the students with and without disabilities walk their students to and from the exercise sessions. This idea works well if entire classes of students with and without disabilities are involved. It does not allow, however, for the interaction possibilities that are present in the idea presented above.

Note: It is possible to implement the exercise program even if you are in a segregated school. The logistics of getting the students to and from each other's school can be difficult, but it is not impossible. In fact, if the schools are in walking distance of each other, you could consider the walk to and from the exercise session as a warm up and cool down.

Preparing and picking up equipment:

Scenario 1. Assign nondisabled peer(s) to be responsible for the equipment. On the "assignment sheet," assign one or two of the nondisabled peers to be in charge of the equipment. Have them go to the exercise setting to help set up the equipment and after the session they can return it to the appropriate place. That will free the staff for other important tasks.



Scenario 2. One of the teachers explains the activity for the day while another teacher (or aide) sets up the equipment. The students help return the equipment after class.

During the Session

The basic framework for the daily exercise session includes three components: warm up, aerobic workout, and cool down. Every exercise session should include five minutes of warm-up exercises aimed at developing flexibility, coordination, muscle tone, or various sport skills. The warm-up exercises are followed by a 20-minute aerobic segment. During this portion, the nondisabled peers and their partners with disabilities walk or jog around a designated course. The role of the nondisabled peers at this point is two-fold: they provide support and encouragement to their partners, and they help to monitor the individually-prescribed intensity determined by the exercise heart rate. Finally, the exercise session ends with a five-minute cool-down period.

A general discussion about warming up, working out, and cooling down is presented below. It is important that you understand what defines good activities for each of these components, so that as you design the protocol for your program you will have the tools to evaluate the appropriateness of any exercise you may select. This discussion is followed by Table 6 that describes ideas for the warm-up, aerobic workout, and cool-down phases of the exercise session. The procedures are organized into three levels. Level 1 procedures are easy to manage and require minimal organization. Level 3, on the other hand, requires more organization and management. As you read through the procedures, think about those that would work best for you. Select the warm-up, workout, and cool-down procedures that your students can do and enjoy. Initially you may use Level 1 procedures, however, with time you may want to incorporate all levels into your exercise program. By doing so, you will enrich the program for everyone.

There is one important consideration as you plan the protocol for your exercise sessions. All of the procedures described in Table 6 revolve around a basic walk or jog format. A continuous 20-minute walk/jog protocol offers the best aerobic workout, but is often very dull for the participants. So this table presents other ideas that add variety to the walk/jog routine as well as challenging the fitness levels of the students. You should note that the addition of these activities may decrease the heart rates of the participants until they learn what is required of them. We recommend a *gradual* introduction of any new activities; allow everyone time to adjust and feel comfortable with the challenges of any new routine before changing the exercise protocol (Please note that the descriptions included in Table 6 detail the basic procedures for the three phases of the exercise session. A description of activities is included in the "Activities Packet" in Appendix B).

TABLE 6. Level 1, 2, and 3 procedures for the warm-up, aerobic workout, and cool-down phases of the daily exercise sessions.

PHASE	DESCRIPTION	ADVANTAGES	DISADVANTAGES
LEVEL 1:			
Warm up and/or Cool down	Walk/Jog: The students warm up and cool down by slowly walking/jogging around the designated course. Special care should be taken to ensure the exercise is performed at a leisurely pace.	• Easy to manage. • No equipment required. • No prerequisite skills. • Easy transition to actual aerobic workout.	• Lack of variety in routine. • Doesn't allow for skill development.
Aerobic Workout	Obstacle Course: Build an obstacle course along or in the center of the designated track or have a variety of reinforcing activities set up around the track (i.e., nerf basketball nets, a mini-trampoline, scooterboards). Then, after completing a designated number of laps (e.g., 3 or 4), have the student dyad complete the obstacle course or the selected activities.	• Minimal management. • Provides variation to routine. • Offers the possibility of introducing a variety of new skills.*	• Obstacles present a learning challenge and may initially result in lower heart rates.
LEVEL 2:			
Warm up and/or Cool down	Group Activity: A staff member (or perhaps a brave nondisabled peer) leads the group in warm-up and/or cool-down exercises. The exercises performed should emphasize slow and gentle stretching and flexibility movements.**	• Relatively easy to manage. • Provides variation to routine. • Offers the possibility of introducing a variety of new skills.*	• Lacks individualization and limits the introduction of more advanced skills until the entire group is able to execute them. • Staff member needed to lead exercise.
Aerobic Workout	Group Intervals: Have the students walk/jog around the designated course until a staff member (or nondisabled peer) indicates that it is time to perform an alternative activity such as skipping, jumping, or lifting arm weights. As a group, they perform the same activity for a short interval (e.g., 1 minute) and then resume the walk/jog routine.*	(same as above)	(same as above)

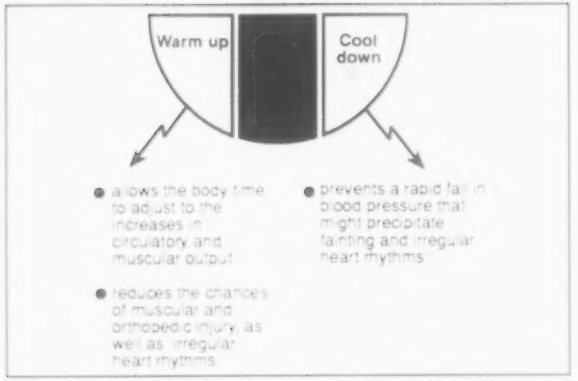
TABLE 6 (cont)

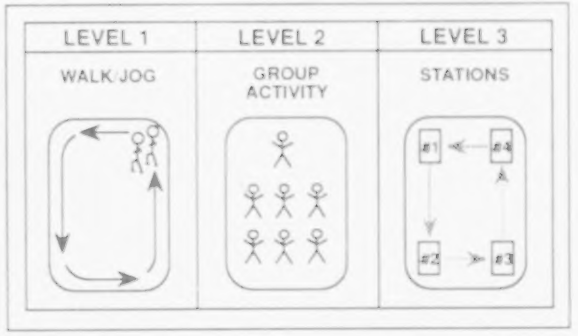
PHASE	DESCRIPTION	ADVANTAGES	DISADVANTAGES
LEVEL 3:			
Warm up and/or Cool down	Stations: Various activity stations are set up in the exercise setting. Each student dyad goes to one of the stations and performs the activity there. Once again, the activities at each station should be slow and gentle and emphasize stretching and flexibility movements.**	• Provides variation to routine. • Offers the possibility of introducing a variety of new skills. • Allows for complete individualization. • Teacher(s) free to offer instruction and encouragement or work on other tasks. • Allows equipment available in limited quantity to be used because different groups use it at different times.	• May require a lot of teacher preparation. • May be difficult to manage.
Aerobic Workout	Stations: Various activity stations are set up in the exercise setting. Then, have the students walk/jog around the designated course until: (1) a designated number of laps are completed or (2) a staff member (or student) indicates it is time to go to a selected activity station.** After performing the activity at the station for a short interval (e.g., 1 minute), the students resume the walk/jog routine.*	(same as above)	(same as above)

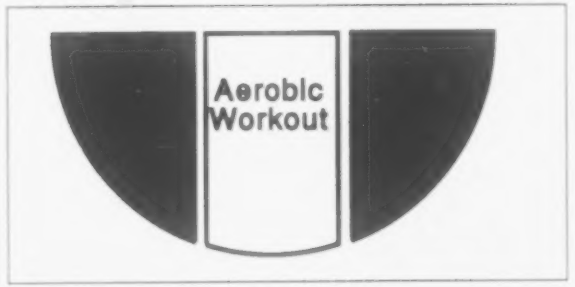
*Indicates the nondisabled peers can provide individual instruction to ensure proper execution.

**Indicates that a cassette tape with designated interludes of music and silence will facilitate implementation of the program. (See Appendix B for details).

NOTE: The protocols described have been developed for ambulatory students; however, nonambulatory students can participate as well. Those who are in wheelchairs or use other prostheses and can maneuver them on their own should benefit from the aerobic components of the program. Those unable to move on their own will not benefit aerobically but the nondisabled peers (instructed by a teacher, staff, or health professional) can lead activities important to their partners' motor development. Hopefully, the social benefits of the program also will accrue from their involvement.


Warm up
Cool down
● allows the body time to adjust to the increases in circulatory and muscular output
● prevents a rapid fall in blood pressure that might precipitate fainting and irregular heart rhythms
● reduces the chances of muscular and orthopedic injury, as well as irregular heart rhythms





The Warm Up and Cool Down

Many times people neglect a warm up before or cool down after their aerobic workout. They either don't know or choose to ignore the importance of these two phases. The warm up allows the body to slowly adjust to the increases in circulatory and muscular output. By warming up, the chances of muscular and orthopedic injury, and irregular heart rhythms are reduced. The cool down is equally important for the participants. After the aerobic component is completed, the heart rate and blood pressure are elevated. If exercise stops abruptly, the circulatory system isn't given the appropriate amount of time to adapt to the sudden changes. By cooling down, one can prevent a rapid fall in blood pressure, which might precipitate fainting and irregular heart rhythms. The warm up and cool down are even more important for persons who are in poor physical condition and those who have cardiac problems. Be sure to include these two components in your exercise schedule.

Here are some ways you might want to have your students warm up and cool down. The ideas presented are descriptions of protocol—*not* specific activities. We will give you ideas for the specific activities a little later. Remember, the procedures are organized into three levels. Level 1 procedures are easy to manage and require minimal organization. Level 3, on the other hand, requires more management and organization.

Level 1: Walk or jog: The students slowly walk or jog around the designated course. Special care should be taken to ensure the exercise is performed at a leisurely pace.

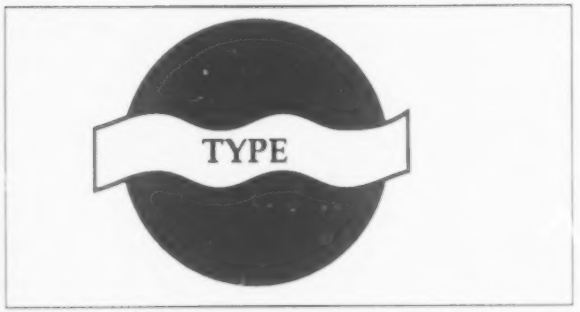
Level 2: Group activity: A staff member (or perhaps a nonhandicapped peer) leads the group in a warm-up or cool-down activity.

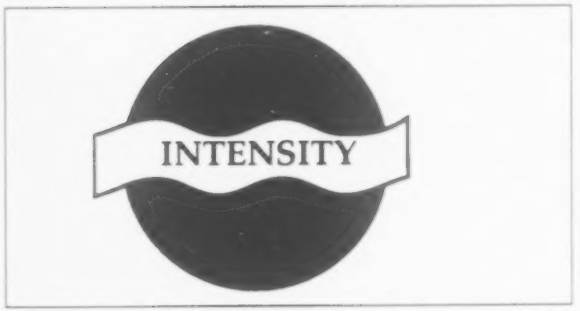
Level 3: Stations: Various activity stations are set up in the exercise setting. Each student dyad goes to one of the stations and performs the activity established for that station.

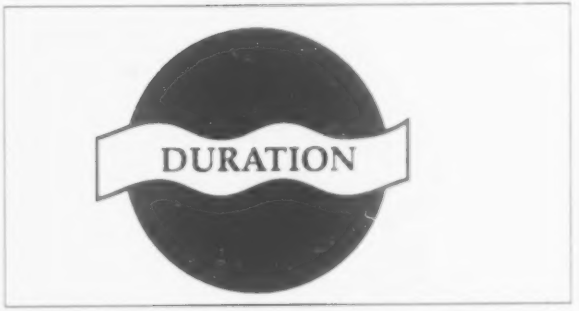
The Workout

Type

Now that we have discussed warming up and cooling down, let's consider the aerobic workout. There are several things to consider when planning the aerobic segment of the exercise session. When developing an exercise program, the first concern is about the best type of exercise. This project has focused on walking and jogging as the format for the aerobic exercise. There are a variety of aerobic exercises, however, and it is important to understand what defines a good aerobic exercise, so that you can substitute alternative aerobic activities into the basic walk/jog program for variety and interest.







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Specifically, activities that rely on lower body muscles, such as running and cycling, are superior to those that utilize only the smaller upper body muscles. Also, exercises involving continuous muscular action generally produce more substantial increases in aerobic fitness than discontinuous sports such as basketball and tennis.

Intensity

Once an aerobic activity has been selected, special consideration should be given to the *intensity* of the action. The workout portion of the exercise session should not be exhausting. You can safely and effectively improve the fitness level of the participants by having them exercise at a comfortable intensity: one that allows them to carry on a conversation as they exercise. One way of determining the appropriate exercise intensity is by monitoring heart rate as they exercise. Research has shown that a desired level of intensity is between 70 and 85 percent of one's maximum heart rate (See the evaluation section of this chapter for instruction on how to calculate target heart rate). Heart rates above 70 percent show more dramatic improvements in fitness, however, training above 85 percent does not provide significant enough increases in fitness to warrant the increased chance of injury to the muscles and bones.

When you start the exercise program, heart rates should be monitored several times during each session, and the intensity should be adjusted accordingly. Soon it will be possible for the participants or their nonhandicapped partners to monitor exercise intensity by the sense of exertion, with only occasional objective monitoring (Special note: heart rate is a built-in coach. As one becomes more fit, exercise heart rates become lower for the same workload. So, after several weeks at the same speed, one may have to increase the speed to keep the heart within the originally prescribed level).

Duration

Another consideration in the planning of the aerobic workout portion is *duration*. How long should the participants exercise? Articles in popular magazines and newspapers give a variety of answers—variations from running a marathon to five minutes on a mini-trampoline. The real answer lies somewhere in between. It is impossible to prescribe one time period that will apply to all fitness levels because duration depends on intensity. A high intensity exercise of short duration can provide the same results as a low intensity exercise of long duration. Therefore, the time allotted to each exercise session depends on the capabilities and interests of the students involved. Here are some general guidelines for continuous activities:

15-20 minutes at 90 % of the maximum heart rate
20-30 minutes at 75-85 % of the maximum heart rate
30-40 minutes at 70 % of the maximum heart rate

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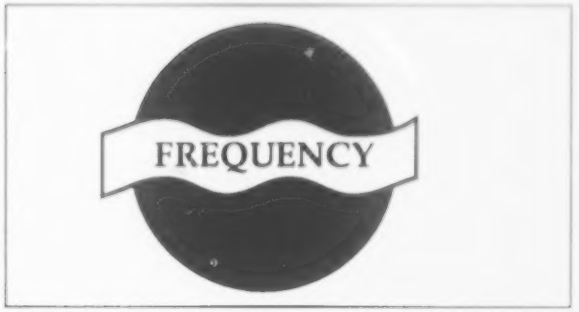
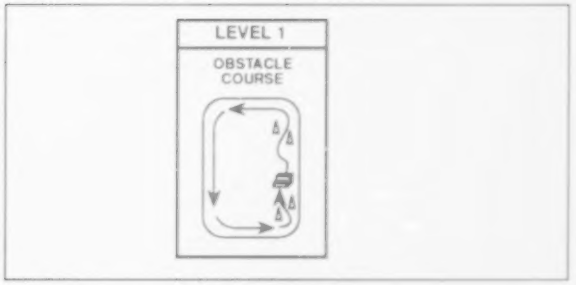
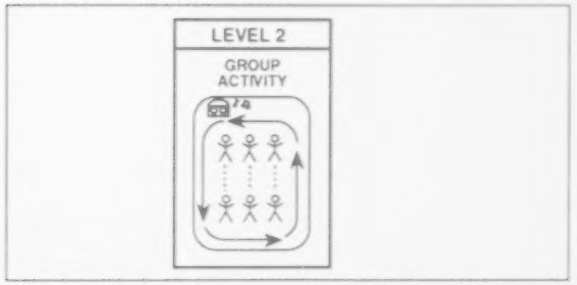






If the students do not enjoy continuous activities all the time or you would like to vary the walk/jog routine by playing a "discontinuous" sport (i.e., basketball, soccer), you will need a longer session, approximately 40-60 minutes.

Frequency

A final consideration for the aerobic component is *frequency*—how often should the student exercise? By experimenting with different schedules, optimal improvements in fitness were produced by exercising three to four days per week. Programs of lower frequency required very high intensity exercise and were often unenjoyable for the participants. Also, it is important to distribute the exercise days. Exercising three days in a row will improve fitness, but the four days of rest that follow will minimize the effects.

In summary, the aerobic component should involve an activity that:

- is continuous
- uses the large muscle groups
- is performed 20 - 30 minutes, three times per week.

You might not want to limit yourself to walking or jogging in a physical education setting. Depending on the unique circumstances of your school, you might want to incorporate swimming, bicycling, or walking to and from a work setting into the format.

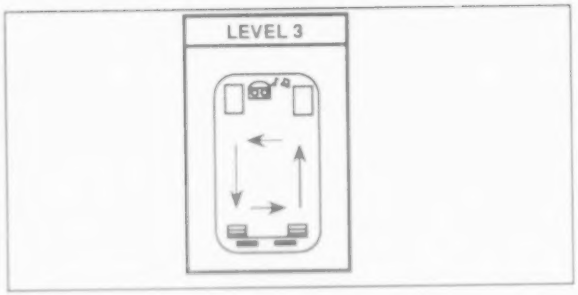
Let's see how you might want to organize the aerobic portion of the exercise session using the levels we discussed earlier:

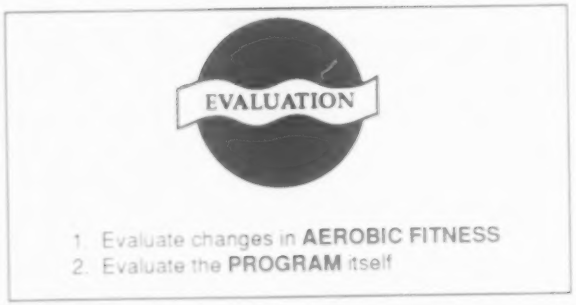
Level 1: Obstacle Course: Build an obstacle course along or in the center of the designated course or have a variety of reinforcing activities set up around the track (i.e., nerf basketball nets, a mini-trampoline, scooterboards). After completing a designated number of laps, the student dyad could complete the obstacle course or the selected activities.

The benefits of an obstacle course are that once it is set up, it takes a minimum amount of time to manage. It also offers the possibility of practicing old skills or introducing new ones on an individual basis. One thing to keep in mind here is that obstacles present a learning challenge, and may initially result in lowered heart rates.

Level 2: Group intervals: Have the students walk or jog around the designated course until a staff member or a nonhandicapped peer indicates that it is time to perform an alternate activity such as scooterboards, skipping, jumping, or lifting arm weights. As a group, they perform the activity for a short interval (e.g., one minute) and then resume the walk/jog routine (A cassette tape may be made to facilitate the movement from the walk/jog portion to the group activity).

Like the obstacle course, group intervals offer the possibility of introducing a variety of new skills, but it doesn't allow for individualization because the activity is performed





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by the group. In addition, it limits the introduction of new skills until the *entire* group is able to execute them. This format is relatively easy to manage, but a staff member is needed to lead the group activity.

Level Three: Stations: Again, various activity stations are set up in the exercise setting. Student dyads go to one of the activity stations and perform the activity there.

Although stations require a lot more teacher preparation than the other two levels, certain benefits accrue. Stations allow for complete individualization and offer the possibility of introducing a variety of new skills. The teacher or teachers are free to offer instruction and encouragement. In addition, this format allows equipment available in limited quantity to be used within the session, because not everyone uses it at the same time.

EVALUATION

After putting forth all the effort to implement the PACP in your school, you may find yourself wanting to know how effective the program really is for your students. In other words, you may want to evaluate the program. Evaluation, by definition, allows individuals to determine the worth or value of something, and appraise the level at which it is currently operating. In this section, we will discuss two ways of evaluating the success of the PACP. The first involves evaluating changes in your students' aerobic fitness levels. The second involves the evaluation of the program itself. Through the evaluation procedure, you will discover the various strengths and weaknesses of your program.

Fitness Evaluation

There are many ways to evaluate aerobic fitness. Laboratory techniques most accurately measure a person's aerobic capacity. Not everyone, however, has access to a laboratory facility, so other means of evaluating the participants' progress are needed. Some alternatives include field tests and heart rate monitoring. An explanation of each of these evaluation methods is presented below.

Laboratory Tests

The most accurate way to measure your students' aerobic fitness level is to have them perform a graded exercise test. During a graded exercise test, your students would

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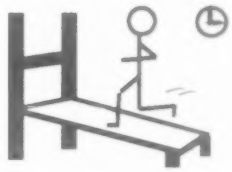
1) LABORATORY TESTS



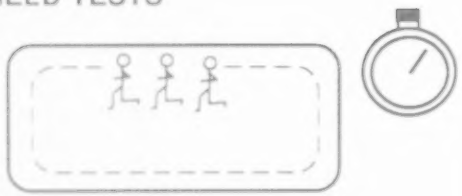
walk on a motorized treadmill under a progressively increasing workload (i.e., grade and/or speed would gradually be increased). As they walked, their heart rate would be monitored closely.

Even though this is the most accurate way to measure aerobic fitness, not everyone has access to a laboratory facility. However, if a university or hospital setting near you has this equipment available, we would urge you to try to make arrangements with them. If you have reservations as to how well your students would handle a testing situation of this nature, you might be pleasantly surprised. Initially, we had strong reservations about how our participants would perform on the treadmill. We were amazed at how well all of them did. In fact, when parents observed the test, many of them were amazed too. When one mother came to the testing session, she was frightened about her daughter's ability to walk on the treadmill. When her child succeeded, she was very pleased—the assessment was beneficial for the student and the parent!

If you decide to evaluate your students by using laboratory tests, please refer to Appendix C for more information.

Field Tests

2) FIELD TESTS



Another way to measure aerobic fitness involves having your students participate in a field test. Field tests are simple walking or running tests that are designed to correlate well with laboratory tests. An example of one field test is included in Appendix C.

Some words of caution regarding field tests: (1) For cardiovascular safety, you should monitor your students carefully as they perform the test. If they show signs of extreme fatigue, dizziness, shortness of breath, or nausea, you should discontinue the test immediately. (2) The results of the tests depend heavily on the motivation of the student. If they put forth their best effort, the results will be the most accurate. (3) Scores for the field test have not been normed for a population of students with disabilities; thereby limiting the significance of the results for the participants in your school. Despite these limitations, field tests may be a good way for you to measure aerobic fitness levels of your students throughout the program.

Laboratory and field tests are not used every day. You would only want to have your students perform tests of this type at critical points in your program. For example, you might want to test everyone before the program begins to assess their baseline fitness levels and then again after 10 weeks of exercise (the minimum amount of time needed for the body to show a training effect), or at the completion of your program.

3) MONITORING HEART RATE

Heart Rate Measures

Heart rate is often used as an indicator of fitness level. Therefore, another way to evaluate the fitness changes of your students would be to monitor resting, exercise, and recovery heart rates during the exercise program. One's heart rate at rest, how high it climbs during a bout of exercise, and how quickly it returns to its pre-exercise level are good indicators of aerobic fitness level. One would expect that, over time, as students become more fit, their resting heart rates would decrease, their exercise heart rates would be lower for the same workload, and their heart rates would return to pre-exercise levels faster than before the exercise program.

If you select this method of evaluation, it would require the monitoring of the participants periodically throughout the exercise program. Below we will discuss two methods of monitoring heart rate and then describe how you can use each of these methods in exercise sessions.

Monitoring Heart Rate

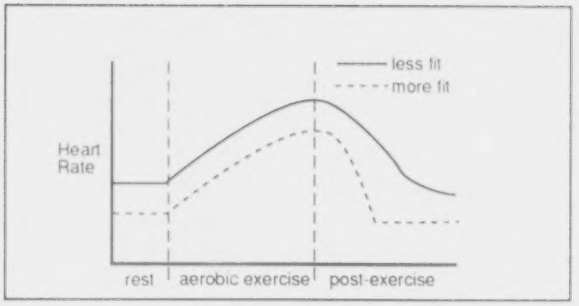
Heart rates may be monitored with the monitoring equipment, or estimated manually by measuring the pulse rate (Pulse rate differs from heart rate, only in that pulse is measured along the peripheral arteries. In irregular cases, the heart beat is not strong enough to push blood to the periphery regularly, and pulse is therefore not indicative of heart rate. In healthy individuals, however, pulse and heart rates are identical. It is for this reason that pulse is regularly accepted as a heart rate indicator).

The easiest way to monitor heart rate is to use a heart rate monitor. There are many types of heart rate monitors on the market today. The cheaper and less accurate monitors utilize a clip that you attach to an ear lobe or a finger tip. The clip picks up a pulse at the location and displays the reading on a watch. Some people have success using these monitors, but we found they did not work well for us. The monitors we used for this project were "Sporttester" monitors produced by Quantum Life Systems, Inc. Rather than picking up a pulse from the finger tip or the ear lobe, these monitors receive their signal from the heart itself (the transmitter is worn around the chest). These monitors have been found to be very reliable, but they are very costly (approximately $250.00). If you can fit it into your budget, we highly recommend purchasing a monitor of this type for your program.

If you cannot afford a heart rate monitor, you can still monitor heart rates to evaluate the fitness changes of your students. The manual method of monitoring pulse requires a bit more effort, but is free. There are generally two sites at which the pulse is taken: along the carotid or radial arteries. When taking a pulse manually, you lay two fingers along the artery (do not use your thumb because it has its own pulse) and count the beats

Heart Rate Monitors

Manual Method



you feel. It is not necessary to count the number of beats in one complete minute. In fact, it is a more accurate reading if you count for a shorter time period (Within the course of one minute, exercise heart rates can slow quite a bit). Therefore, you might want to have your students count for 15 seconds and multiply by four, 10 seconds and multiply by six, or six seconds and multiply by 10.

How to use heart rate monitoring

Now that you know how to monitor the pulse, how will you use this to evaluate the fitness changes of your students? Remember we said that good indicators of aerobic fitness level are the heart rate at rest, how high it climbs during a bout of exercise, and how quickly it returns to its pre-exercise level. By evaluating one or all three of these heart rate measures during the session, you will get a picture of the changes in the students' level of fitness. Let's look at how to evaluate each of these measures.

Resting heart rate

Ideally, resting heart rate should be determined in the morning before getting out of bed. Because it is not possible to get this reading on the students, however, the next best thing is to find a time when the students are quiet. As they are sitting quietly, take their pulse either with the monitor or manually (If you do have access to a monitor, you may want to have one student wear it all day, and the lowest recorded reading could be used as the resting heart rate).

Keep a file of these readings. As students begin to grow more fit, their resting heart rates may decrease. This decrease in resting heart rate generally represents the increased strength of the heart muscle. After a training program, the heart is now stronger so that it need not beat as many times to circulate the same amount of blood.

Exercise heart rate

The fitness benefits of exercise are closely related to the intensity. Research has shown that 70-85 % of one's maximum heart rate is a good training level. Heart rates less than this typically do not enhance cardiovascular fitness, and heart rates above this increase the likelihood of muscle and bone injury. Therefore the optimal training intensity is between 70 % and 85 %.

The formula used to determine this range is as follows:

HRtraining = (HRmaximum - HRrest) X (Conditioning intensity) + HRrest

Scientists have found that maximum heart rates are related to age. As a person

gets older, the maximum heart rate declines. This decline is fairly consistent, and thus a fairly accurate estimation of HRmaximum can be determined with the following formula:

HRmaximum = 220 - one's age

Here is an example of how to compute a training heart rate range for one of your students:

Background: Julie is 12 years old. During a quiet time you recorded her resting heart rate at 60 beats per minute.

1. First you would calculate her maximum heart rate:
   HRmaximum = 220 - 12
   = 208 beats/minute
2. Next you would determine what her heart rate would be at 70 percent of her maximum:
   HR at 70% = (208-60) (.70)+60
   = 164 beats per minute
3. Next you would determine what her heart rate would be at 85 percent of her maximum:
   HR at 85% = (208-60) (.85)+60
   = 186 beats/minute
4. Therefore, to achieve an improvement in aerobic fitness, Julie's heart rate should be between 164 - 186 beats per minute when she is exercising.

Monitoring heart rates, either with a monitor or manually during the exercise session can be a very useful evaluation tool for your program. If you use a monitor, the procedure is easy. During the warm-up portion of the session, you can select a student to wear the monitor. The heart rate monitor does the rest—it beeps when the student is out of the pre-set target heart rate range, and also displays the heart rate on the watch. The students with and without disabilities can keep track of whether they are exercising at the appropriate intensity.

If you do not have a heart rate monitor, the task of monitoring exercise heart rates is a little bit more difficult. While the exercise program is just getting underway, you should have the students monitor their exercise heart rate several times during the session and adjust the intensity accordingly. With time, it will be possible for them to monitor the intensity simply by their sense of exertion, and only occasional monitoring will be necessary.

If you keep track of this data throughout the program you will get an idea of the fitness changes in your students. As mentioned, heart rate is a built-in coach. As your

students become more fit, their exercise heart rates will be lower for the same workload (i.e., the same speed). So that after several weeks at the same speed, they may have to increase speed to get their heart rate up to its prescribed training range.

Post-Exercise Heart Rate

Post-exercise heart rate

Monitoring how quickly your students' heart rates return to their pre-exercise level following the exercise session is another way to evaluate their aerobic fitness. There are standardized step tests that measure how quickly the heart rate decreases after stepping up and down from a stair or bench. Unfortunately, however, the testing procedures are not appropriate for students with disabilities. For your purposes you might want to keep track of the participants' heart rates one, two, and then five minutes after the exercise session. Over time, you would hope to see the heart rates dropping more rapidly between the time the session ended and the various times post exercise. If you compare the data across sessions, you must try to keep the aerobic portion of the session the same. After all, you can't compare the recovery heart rates if the aerobic segments stress the heart differently.

Note: Although the focus of the PACP is aerobic fitness, we have mentioned that a variation in routine is helpful in motivating the participants (see the protocol and motivational strategies sections). One suggestion was to build into the routine various games and sport skills. You might want to evaluate your students' skill level periodically throughout the program. A sample skills checklist is included in Appendix C to help you.

Program Evaluation

Perhaps the easiest and best way to evaluate the effectiveness of the program itself is to ask the people involved. By asking the students with disabilities, the nondisabled peers, their parents, teachers and staff, and the administrative personnel how they feel about the goals, procedures, and outcomes of the program, you will learn about the positive aspects of your program, and about those aspects that may need to be modified.

One way you might get this information is by having the various "consumer" groups complete a questionnaire or survey about the program. The student responses would provide valuable feedback about the daily exercise sessions. They could comment on the protocol, the activities, and the development of their relationships with peers. The parents, on the other hand, would provide a different perspective. They could report on any changes they may have seen in their child at home, which may have been influenced by the program (i.e., the student interacts more frequently with other neighborhood

children or sleeps better at night). Teachers and staff could provide additional information on how the program has impacted individual students. In addition, they could report on any logistical concerns. Finally, the administration may provide feedback on how well the program fits into the school regime.

A sample of the "Consumer Satisfaction Survey" used by our project staff is presented in Appendix C. Our survey was designed to determine how the respondents felt about the goals of the program, how it was conducted, and how effectively it met its goals.

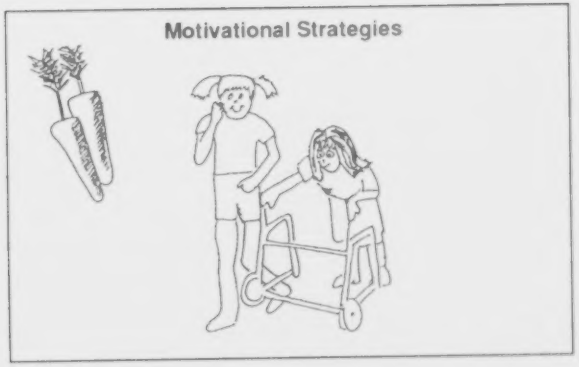
The information gained from the survey may be helpful to you as you develop your program. It will help you evaluate the accomplishments of the current program, and aid in the development of an improved program for the future.

Motivational Strategies

The reasons for beginning an exercise program and the motivation that maintains continued performance may be very different for persons with disabilities and their nondisabled peers. Typically, nondisabled persons exercise for reasons that are cognitively based (i.e., weight loss, improvement in health status, body image, and relaxation), and that may not be applicable to persons with disabilities. The concern then arises - What can be done to motivate participants who do not use the cognitive rationale that typically motivates people to begin and maintain exercise?

The PACP Model addresses this concern in two ways. One, pairing students with disabilities and their nondisabled peers during the exercise sessions provides an opportunity for positive interactions to occur between partners, which might help to motivate the participants. It may take more than this partnership, however, to motivate those students who find it difficult to exercise for 20 minutes, three times per week! This section outlines some motivational strategies (reinforcement systems) that you might find helpful for those students (with and without disabilities) who are difficult to motivate. The strategies described have been organized into four categories: social, tangible, activity, and edible. Each category will be discussed and ideas for implementing each strategy will be presented. The actual materials for implementation are included in Appendix D.

As you read this section, think about your student participants. What are their interests and hobbies? What makes them happy? What is important to them? Is there anything they would love to receive or hate to lose? If you find that you really don't know the answers to these questions, you may want to take some time before you begin the exercise program to find some answers. After all, having this information may help make



your exercise program more enjoyable for everyone. Some suggestions for finding out what is reinforcing for your students are presented in Appendix D.

Strategies

Social

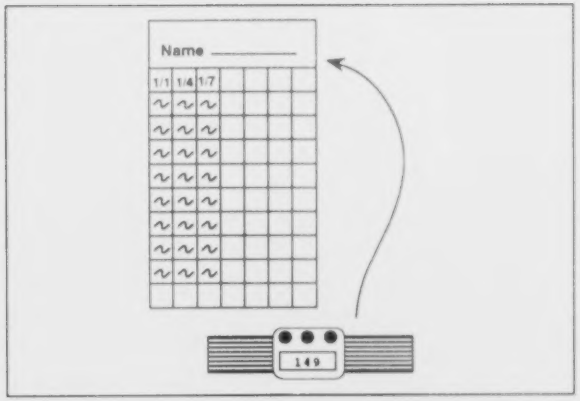
One easy and very effective way to motivate your students is to let them know when they are doing a good job. It's so easy you'll hardly realize you're doing it, but it will make such a difference! Praise them, give them a smile or a hug. Let them know you like what they're doing. Be enthusiastic! You may want to take this recognition one step further, and tell a student's parents, teachers, or the principal when you think that he or she has done a particularly good job.

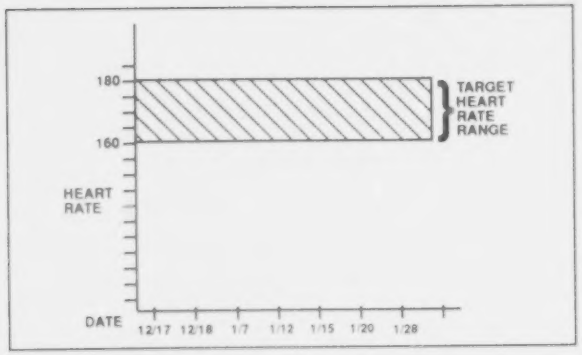
Tangible

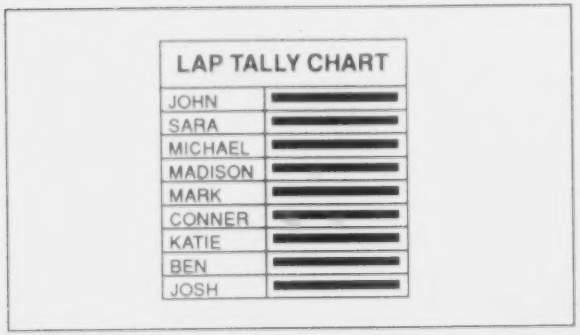
Another easy and effective way of maintaining interest in your exercise program is to reward the participants with some kind of tangible item. It might be a sticker, note, button, card, token, or other trinket that you have determined to be reinforcing for your students. Tangible items can be very reinforcing, but they also can cost money. Depending on your budget, here are some ideas that might work well for you (*Note:* if the students with disabilities have a token system already established in their classroom, it can be easily extended to the exercise program. Some suggestions on how to extend it are included in the examples below).

Low budget

One inexpensive and very effective way we found to motivate the nonhandicapped participants in our program was to involve them in the evaluation process. During the exercise sessions, heart rates were monitored using a heart rate meter (the manual method could also be used). In each exercise session, a student was targeted to have his or her heart rate monitored. The heart rate monitor was worn by that student during the aerobic portion of the session and his or her heart rate was recorded in the monitor's memory for each minute. At the end of the session, the heart rate readings for each minute were recorded on a data sheet. We would then calculate the average heart rate for that session, and graph it on the student's individual graph. We would then be able to show the students whether or not they were successfully keeping their partner's heart rate in the appropriate range for cardiorespiratory improvement. The students really





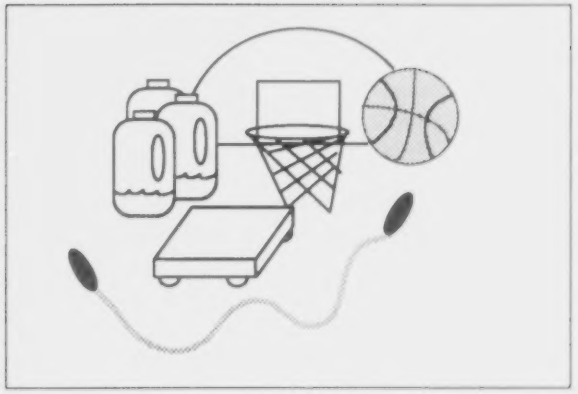


enjoyed this aspect. If you have time and the students are old enough, they can tabulate the average heart rates and graph the results themselves—what a wonderful math lesson!! (Other data for graphing could include: the number of laps completed or the number of minutes run. See Appendix D for some ideas.) If a token system is used, tokens could be rewarded for achieving the targeted heart rate, completing a certain number of laps, or running a designated number of minutes.

Another no-cost way of tangibly reinforcing your students would be writing individual notes to each of them. You might want to comment on their performance or provide support for their participation in the program. A personalized note would be ideal, but if you have a busy schedule, you might want to try a quick and easy "form letter" like the one presented in Appendix D.

High budget

Another more expensive way we found to maintain interest during the exercise session included having the students monitor the number of laps they ran. A system was created whereby the completion of a certain number of laps earned a certain number of points. When enough points were accumulated the group won a prize of their choice. Our group of students decided they wanted to work for t-shirts designed by one of them. So, a lap tally chart like the one presented in Appendix D was made. The names of each student with a disability were listed on the chart and a velcro strip was placed next to the names. Numerous red and green circles (or tokens, if a token system is used) were made with small pieces of velcro glued to the back. Because of the variation in skill level, it was determined how many laps each individual student could complete during one session—these were the required laps. That number of red circles was attached to the velcro strip next to that child's name *before* the start of each exercise session. During the session, as the student pair went past the chart, a nondisabled peer assigned to work at the chart would remove one of the red circles. If the pair completed all the laps, green circles would be added for the additional laps run. One point was awarded for each student dyad that completed the required number of laps and one to two more points added for additional laps completed. In addition, if *all* the students completed their required laps, then an additional five points were awarded. This helped to foster a feeling of cooperation. Each day the points were tallied and added to the previous day's total. To keep sight of the goal, a diagram of a t-shirt was posted by the lap tally chart. As the group accumulated a predetermined number of points, a part of the t-shirt design would be added to the model. When they acquired the final number of points, the t-shirt model was complete and each student received a t-shirt. The students loved it (Other prizes could be a party, a field trip, or an extra recess period. Some of the costs that might accrue from these ideas could be reduced by help from students or parents).



Activities

Creating interesting and varying routines during the exercise sessions is another way to help ensure interest and cooperation in the program. One way to do this is by enriching the aerobic portion of the session. For example, rather than having only the student dyads walk or jog, build an obstacle course along or in the center of the track; or have a variety of reinforcing activities set up around the track (i.e. nerf basketball nets, a mini-trampoline, and scooterboards). Have the students walk or jog for 2 minutes, and then as a group have them perform another activity for one minute (the activities could include lifting milk carton weights, stair stepping, jumping, hopping, scooterboarding, etc.). Finally, stations with a variety of activities could be set up around the track. After a two-minute walk or jog, the dyads could go to a station for one minute (See the protocol section for more details). The slight diversions from a straight 20 minutes of walking or jogging help to alleviate boredom.

If you find it difficult to incorporate a variety of activities into your exercise session, you may at times want to shorten the workout period and end the session with a fun game (see activities packet), free play, or another activity you have found that your students enjoy. Or, you might want to teach specific game skills (i.e., dribbling, kicking, throwing) at another time, that would allow for variation of activity during the actual aerobic session.

Edibles

As you know, edibles such as M&M's, popcorn, raisins, and juice can be very successful reinforcers. However, they may be very inappropriate for your exercise sessions. After all, the purpose of exercise is to improve the participants' health profile by improving their aerobic fitness and decreasing their body fat. Using food and drink doesn't foster these objectives.

However, if you know edibles are very reinforcing and no other alternatives are effective you may wish to use them sparingly during the session.

Summary

Finding effective reinforcement strategies is integral to the success of your fitness program; they can promote enthusiasm and increase motivation. There are several helpful hints that seem to improve the effectiveness of reinforcers: (1) remember what one student finds to be pleasurable may be boring to another, (2) the reinforcement must be genuine and presented only for the appropriate behavior, and (3) it must be presented

immediately after the appropriate performance has occurred. Do not be discouraged if your strategy does not work the first time: Keep trying! Eventually you will find systems that work well for everybody.

Chapter 5
Exemplary Model Descriptions

In completing the manual to this point, you have learned about the various components of the PACP, and information about the nondisabled peer training curriculum and the daily exercise sessions has been shared. In order to see how all this information is put together into a working program for your school, this chapter presents two descriptions of exemplary daily exercise sessions. These descriptions are meant to serve as general models, *not* as rigid procedural guides. Hopefully, they will encapsulate all of the ideas presented as well as stimulate new ideas so that your program will be the best possible!

A Session for Persons with Severe Disabilities

A model description for one daily exercise session for students with severe disabilities is presented below. The model describes a procedural plan for getting the students to and from the exercise session, a protocol for the exercise session itself, and the motivational strategies used.

Background

Students with Severe Disabilities

Eight students from two different classrooms participate in the exercise sessions. Seven students (aged 7 to 10) are from one classroom, the eighth student (12 years) is from a different classroom. All have physical and intellectual disabilities. Three participants use wheelchairs; one can propel herself, the others cannot. The other five students are ambulatory.

PARTNER SHEET		
John	Michael	Good session on Mon. THR's look super.
Pam	Bonnie	Since Bonnie's been sick, take it easy today.
Debra	Susan	
Peter	Marc	Marc had trouble on stairs, take it easy going up.

Six of the students (the two students who could not move their wheelchairs were excluded) completed an exercise evaluation that included height and weight measures and a field test of aerobic fitness (See Appendix C for examples).

Nondisabled Peers

Twenty students from a fourth grade classroom volunteered to serve as partners in the exercise sessions. Only 11 of these students participate on any given day. All of the students completed the peer-training curriculum.

Teachers

Two teachers and two aides are involved in conducting the program. The fourth grade teacher of the nondisabled volunteers presented the curriculum units to his classroom. In addition, he spends some time each Friday during math period helping his students graph the results from the week's exercise sessions.

One teacher and an aide for the students with disabilities actually conduct the daily exercise sessions.

The Daily Exercise Session

Before the Exercise Session

Teacher Responsibilities:

1. Complete assignment sheet (See example below).
2. Select activity for exercise session (See warm-up activities and parachute games in Activities Packet in Appendix B).
3. Have appropriate materials ready.

Nondisabled Peers' Responsibilities:

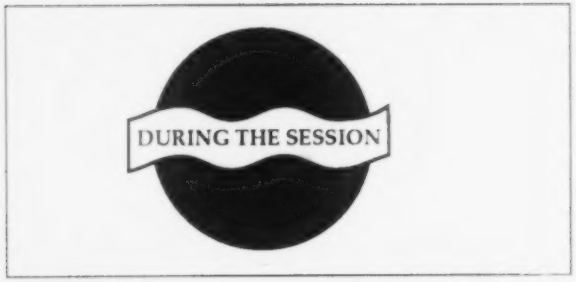
1. Check Assignment Sheet.
   a. Pick up partner with disabilities from classroom and bring to exercise session, OR,
   b. Set up gym equipment.

Scenario:

Before the exercise session begins, the Assignment Sheet is completed and displayed in the fourth grade classroom. At the appropriate time, each nondisabled

student reads the assignment sheet and goes to pick up his or her partner from the classroom (One nondisabled student has been assigned to help set up the gym equipment and monitor laps; this student will go directly to the gym to help the aide set up).

During the Exercise Session

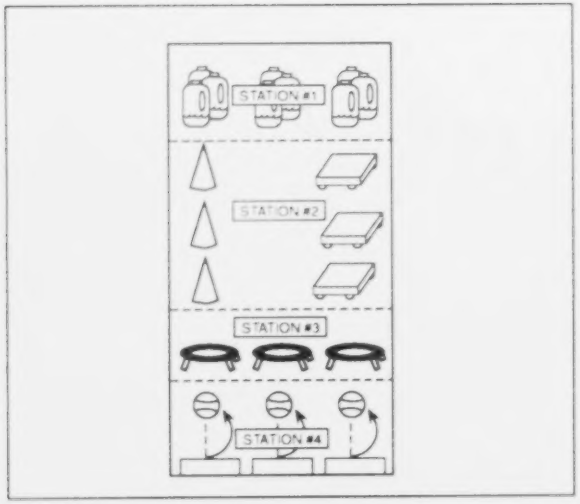


Teacher responsibilities:

1. Monitor motivational strategies. Are the nondisabled students following the suggested methods?
2. Monitor heart rates.
3. Help any dyads that need assistance.
4. Offer encouragement.
5. Observe: Are the students working well together? Are they having fun? What can be done to improve their enjoyment?

Nondisabled Peers responsibilities:

1. Monitor heart rate (if partner is targeted, watch the monitor; if not, try to monitor partner at an appropriate pace).
2. Implement motivational system appropriately.
3. Offer encouragement.
4. Follow physical therapist's instructions if working with nonambulatory student.



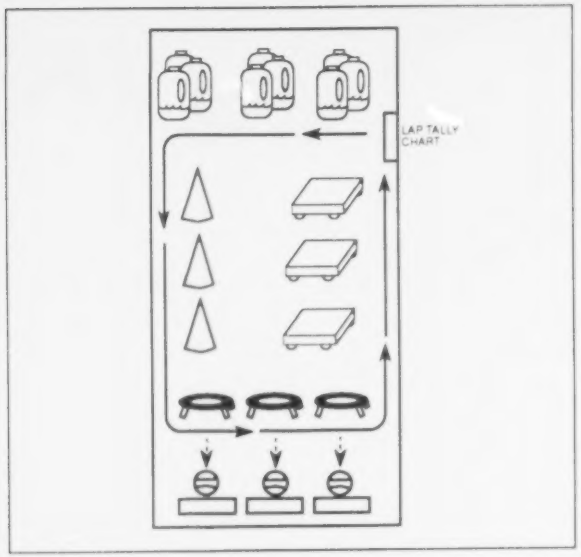
Warm up (five minutes)

When the nondisabled peers and their partners come to the gym, they immediately move to one of the four activity stations. The dyads perform the exercise at the station; if time allows, they can move to an additional station. The teacher or aide moves to the different activity stations and comments on the motivational and technical strategies used.

Sally has been targeted for heart rate monitoring (see assignment sheet). She and her partner will *not* go to an activity station; rather, she puts on the heart rate monitor with the help of a teacher or an aide.

Aerobics (15 minutes)

After the five-minute warm up, the students begin the aerobic portion of the session. The aerobic portion is shortened to 15 minutes for today only (Ten minutes are needed for the parachute games used during cool down).



- Ambulatory students: The six ambulatory students walk, jog, or wheel around the designated track. At the same time, a teacher will help Sally and her partners (John and Brad) start the heart-rate monitoring.

- Nonambulatory students: The two students using wheelchairs work with their partners on specific exercises prescribed and demonstrated by the students' physical therapist.

Motivational Strategies

Group: A lap chart is posted in the corner of the gym (See example in Chapter 4). Each time a dyad passes this point, one of the preposted red circles is removed. When the pair has completed their predetermined number of laps (all red circles have been removed), green circles will be added for each additional lap. At the end of the session, points are awarded and added to the accumulated points toward a mutually determined goal; in this case a t-shirt designed by a student.

Note: The nondisabled peer assigned to help set up the equipment will be the person in charge of pulling the circles off the lap-tally chart.

Individual: Individualized motivational systems have been developed for each of the students with disabilities, however, every system is not used each day. A list of the programs used during this session are described briefly below.

Sally: Sally loves jumping on the mini-trampoline. After completing a given number of laps, she gets to jump on the trampoline set up in the corner.

Bill: Bill can wheel his wheelchair by himself. His partner carries a nerf basketball and as Bill passes the nerf baskets set up along the track, his partner gives him the ball, and Bill makes a shot (Eventually, Bill will carry the ball himself).

Heather: Heather stops or falls to the ground when she doesn't feel like walking or when she's tired. She loves music. She wears a headphone and a cassette. Her partner lets her listen to the music as long as she walks at the appropriate pace. As soon as she stops or falls down, her partner turns off the tape. As soon as she walks, the music starts again.

Jerry: Jerry has been uncooperative the last few exercise sessions. His partner discovered that he enjoys the scooterboard. Today, after walking three laps he gets to ride the scooterboard through a simple obstacle course set up in the center of the course (if the obstacle course doesn't work, he can scooter around the track).

Cool down (five minutes)

As soon as the aerobic portion of the period is over, the students make a large circle. The teachers bring out the parachute and everyone holds on to its perimeter to participate in the planned activity (Popcorn: in the Activities Packet).

After the Exercise Session

After the exercise session, the nondisabled peers walk their partners to their classrooms and then return to their own classrooms.

The nondisabled peer who monitored heart rate will hold onto the watch and will record the information on the individual's graph during the appropriate class time. The nondisabled peer assigned to the lap tally sheet will help put the equipment away and then will return to his or her classroom.

A Session for Persons with Moderate Disabilities

A model description of one daily exercise session for students with moderate disabilities is presented below. This description is similar to the model described for students with severe disabilities, but it will provide you with some additional ideas to encourage the participants during the exercise sessions.

Background

Students with moderate disabilities

Eight students from one classroom participate in the exercise sessions. All have intellectual disabilities and varied deficiencies of coordination. All of the students completed an exercise evaluation, which included height and weight measures and an aerobic fitness field test (See Chapter 4 [fitness]).

Nondisabled peers

Ten high school students without disabilities volunteered to serve as partners in the exercise sessions. The teachers and administrators of the school agreed to allow the students to leave their regularly scheduled class to participate in the program for 30 minutes, three days a week.

Teachers

One teacher and one aide are involved in conducting the program. An aide from the special classroom visits the peer classroom to talk with the volunteers about the handicapping conditions of the students with whom they will be working. Emphasis is placed on the fact that the students are *physically* and not necessarily *mentally* disabled.

The Daily Exercise Session

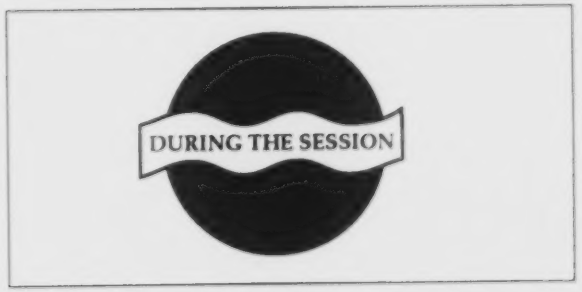
Before the Exercise Session

Teacher Responsibilities:

1. Determine nondisabled peer assignments.
2. Instruct students to meet the students with moderate disabilities in their classroom.
3. Select activity for exercise session (See Activities Packet in Appendix B).
4. Have appropriate materials ready.
5. Show nondisabled peers the heart rates of the previous session and discuss motivational strategies for the upcoming session.

Nondisabled Peer Responsibilities:

1. Pick up students with moderate disabilities at their classroom.
2. Help set up equipment.



During the Exercise Session

Teacher Responsibilities:

1. Monitor motivational strategies. Are the peers following the guidelines?
2. Monitor heart rates.
3. Help any dyads that need assistance.
4. Offer encouragement.
5. Observe: Are the students (nondisabled and disabled) working well together? Are they having fun? What can be done to make it better?

Nondisabled Peer Responsibilities:

1. Monitor heart rate (If partner is targeted, watch and listen to the monitor. If not, keep partner at an appropriate pace).
2. Implement motivational system appropriately.
3. Offer encouragement.

Warm up (five minutes)

When the students arrive at the gym, they have a chance to talk as they help set up the equipment needed for that day. When the equipment is set up, the teacher begins the exercise program. It is generally a five-minute period of slow jogging.

John has been targeted for heart rate monitoring. He and his partner will not help set up the equipment, rather they will put on the heart rate monitor with the help of a teacher or an aide.

Aerobics (20 minutes)

After the five-minute warm up, the students will begin the aerobic portion of the session (see Activity Packet for options). Four different stations are set up with the following activities: jumping, sprinting, arm weights, and climbing stairs. The students have been assigned partners, and are divided into four groups. Each group stands at one of the four stations, without actually performing that activity. The music begins.

The tape (see Appendix B) plays music for two minutes during which the students jog around the gym in a large circle. When the music stops for 45 seconds of silence, the students run to the station where they began. They perform the activity at that station until the music begins again. During the period of music, they jog laps until there is silence again. At this point the groups move on to the station ahead (clockwise) of the one where they began. Nondisabled peers are key to assuring that total chaos does not break out and that groups find the appropriate stations. The aide keeps track of the groups and appropriate stations on a chalkboard in the gym in case students need a reminder.

The cycle continues—jogging laps for two minutes followed by 45 seconds of a more intense activity.

Motivational Strategies

Individual: Tom walks slowly or stops when he doesn't feel like exercising. His partner waits for him and attempts to find something to interest Tom to keep him jogging. Tom's peer is instructed to talk with Tom only while he is jogging, and to jog ahead if Tom slows down below his target range. Slowing down to meet Tom's pace seems to reinforce slower movement.

Sarah: Sarah never wants to exercise. At the end of a session she has usually

completed about half the number of laps as the rest of the group. Her teacher has set up an individualized reinforcement program that fits into the classroom activities. The number of laps Sarah completes are counted as part of the contingency.

John: John, the student with the heart rate monitor, is not working within his target heart range when he jogs around the track. His peer challenges him to a race around the track to encourage him to run faster. Occasionally they choose someone ahead of them to try to catch or pass.

Cool Down (five minutes)

As soon as the aerobic portion of the period is over, the students will slow down to a slow jog or walk.

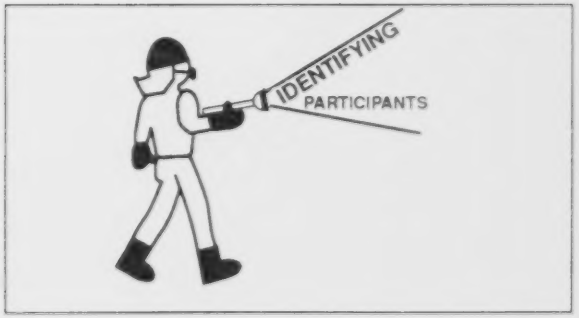
After the Exercise Session

Teacher Responsibilities:

1. Put away equipment.
2. Reinforce deserving students for a job well done.
3. Observe heart rates monitored and adjust exercise program to attempt to bring students within their target heart ranges.

Chapter 6
Administrative Concerns

The Peer-mediated Aerobic Conditioning Program (PACP) has been designed for implementation in integrated school settings. The project staff has worked hard in developing creative and practical materials for your use in implementing the program. However, even with these materials available to you, there is still a lot of initial planning required before you can actually begin the program in your school. This chapter provides a list of considerations and some of the materials helpful in getting the program started. Keep in mind that your school is unique, and the list of considerations are intended to serve only as guidelines as you begin to plan for the implementation of the PACP.



A List of Considerations

Now that you have read about the PACP, you probably have formulated some ideas about how the program could work in your school. Below are some considerations you might find helpful as you further plan the PACP model for your school.

Identification of Participants

The PACP requires the active participation of students with disabilities and their nondisabled peers. The teachers of both the students with and without disabilities should also be actively involved in the program. One of the primary criteria for implementation of the PACP is the identification of the key participants.

Considerations for selection of *students WITH* handicaps

1. Need for exercise
2. Number
3. Degree and type of handicap
4. Informed consent/medical clearance
5. Other

Considerations for selection of *students WITHOUT* handicaps

1. Same or similar age peers
2. Informed consent
3. Other

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Considerations for selection of students with disabilities:

Need for aerobic exercise

A primary consideration in the selection of participants with disabilities for the program is their need for aerobic exercise. Those students whose daily routines provide little or no aerobic exercise should be the first candidates considered.

Number

The number of students who can safely participate in the program depends on the space available for exercise and the number of staff available to supervise the exercise sessions. If possible, start small, you can always add more students later!

Degree and type of disability

The structure of the exercise sessions allows for the individualization of training regimens; therefore, the degree and type of disability is not a restriction. However, the PACP focuses on aerobic exercise that requires sustaining one's heart rate at an individually prescribed level for approximately 20 minutes. These requirements are most easily met with students who are ambulatory or able to propel themselves with a wheelchair.

Informed consent/medical clearance

For medical and safety reasons, informed consent for participation and a medical clearance form ought to be completed prior to any involvement in the exercise session (See examples of Informed Consent and Medical Clearance forms in Appendix E).

Other

Other considerations will enter into the final selection of students with disabilities. Examples include student and teacher schedules, time and space availability, and behavioral/disciplinary problems. Another consideration is whether all the students will come from the same classroom (which might entail planning for a variety of skill levels and disabilities) or be drawn from several classrooms (which might allow for closer matching of skill levels).

Considerations for Selection of Nondisabled Students

Same- or similar-age peers

In an effort to obtain normalized peer relationships, it is important to include nondisabled students who are nearly the same age as the students with disabilities.

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Informed consent

Depending on the policies of your school, informed consent for the nondisabled peers may or may not be necessary.

Other

Student and teacher schedules, time and space availability, and behavioral or disciplinary problems are considerations for selection of the nondisabled peers as well. Another consideration may be the selection of students on the basis of benefit to them. For example, for nondisabled students with a low self-concept, their selection in a special project, the relationship they will develop with their peers with disabilities, and the reinforcement from teachers and staff may make them feel better about themselves. Or, if a nondisabled peer is in poor physical condition and has trouble keeping up with his or her classmates in a regular physical education class, perhaps the pairing with a student with disabilities who is in similarly poor condition could be mutually beneficial to both.

Considerations for Selection of Teachers (Nondisabled and Disabled)

Interest

Probably the key factor in getting the program set up in your school is the commitment and interest of the teachers involved. If the teachers to be involved feel integration and exercise are important for their students, other hurdles to the implementation of the program can be overcome.

Time commitment

Time requirements involve the training of the nondisabled students (curriculum units) and the planning and supervision of the three weekly exercise sessions. Working with other teachers may initially require some additional time, but once the division of responsibilities between teachers has been determined, that time commitment should be reduced.

The time allotted to this program does not have to be considered as an isolated segment of the students' curriculum. The units on aerobic conditioning and handicapping conditions in the nondisabled peer training component could fit easily into a health/science and social studies curriculum. The activities for determining target heart rate and/or graphing student progress during the exercise sessions could be used to help reinforce some already-learned math concepts (depending on grade level). Nor does the time allotted for the exercise sessions have to be an additional scheduling concern. The sessions could be arranged during an already-scheduled physical education time period.

CONSIDERATION FOR PROGRAM IMPLEMENTATION

Logistics
- Time and space
- Getting to & from exercise
- How many staff members

Protocol

Evaluation
- Aerobic fitness
- Program

Motivation

Implementation of the Exercise Sessions

In order to develop and maintain safe and effective cardiorespiratory fitness the following guidelines should be observed: (1) exercise three to five days per week, (2) exercise at 60 to 85 percent of one's maximum heart rate, and (3) exercise continuously for 20-60 minutes using large muscle groups (See Aerobic Conditioning Unit for further explanation). With these guidelines in mind, the program should take into consideration the needs and goals of all the participants.

Considerations for Program Implementation

Logistics

Time and space

How long do you want the exercise program to run (10 weeks, 20 weeks, the entire year)? Is there space available in the school or can you only exercise outside? Is there equipment available at the time you need it? Do you have approval from the necessary personnel?

Transportation

How are the students going to get to and from the exercise session? Can they get there and return on their own? Can the nondisabled students pick up and return the students with disabilities to their classrooms? Will the teachers walk them to and from the setting?

Staff size

How many staff are needed during the exercise session? Are there any students with medical concerns? Are there any students with disruptive behavior that might require additional staff? Do you want to keep data on heart rate changes?

Protocol

Determining the protocol for the exercise sessions depends on a variety of factors unique to each school (i.e., the participants' ages and degree of disability, the space and equipment available).

Evaluation

Monitoring the students' fitness improvement (via heart rate, number of minutes of actual exercise, number of laps run, or improvement on field tests) can be both very informative and very rewarding, but it also requires some additional time. Do you want to incorporate some or all of these measures into the design of your exercise program? (See motivational strategies in Chapter 4 for suggestions).

Motivation

Determining the type of reinforcers to be used during the exercise program will also depend on a variety of factors (i.e., the participants' age and degree of disability, equipment available, amount of time, reinforcement schedules already in place in the classrooms, and your philosophical concerns). Suggestions for various motivation strategies are presented in Chapter 4.

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APPENDICES

The materials helpful to the successful implementation of the PACP are included in the appendices that follow. Each of the materials described has been introduced earlier in the Protocol, Evaluation, or Motivational Strategies sections of this manual, and a summary description of how the materials can be used precedes the actual material.

The materials have been designed with a teacher's busy schedule in mind—some just need to be copied, others require some cutting, while others may take a little bit more of your time.

APPENDIX A

Aerobic Conditioning Unit Pre/Posttest

If you want to test your students' knowledge about aerobic conditioning prior to and/or after your introduction of the material, we have included a sample test for your use. Their score on this test should in no way affect their performance in the PACP, it is included for you to use if you see fit.

NAME:_____DATE:_____

____4 points 1. Indicate whether the following statements are true or false by marking a "T" if the statement is TRUE or an "F" if the statement is FALSE.

F Ten minutes of exercise, three times each week is enough to improve the condition of your heart and lungs.

T One way to measure how hard you are exercising is by taking your pulse (i.e., heart rate).

F 70 to 85 percent of your maximum heart rate is a recommended level of exercise. However, if you exercise above 85 percent, it is even better for your body.

F If you exercise very hard, you only need to exercise one day each week.

____8 points 2. a.) Look at the chart below. Would the measures increase, decrease, or stay the same following a 10 week aerobic exercise program? In other words, what are the long-term effects of exercise? Put an "L" in the box that indicates the correct answer.

Measure	Increase	Decrease	Stay the Same
Systolic Blood Pressure	I	L	
Diastolic Blood Pressure		I	LI
Heart Rate	I	L	
Number of Capillaries	L		I

b.) Look at the chart again. Would the measures increase, decrease, or stay the same during an exercise session? In other words, what are the immediate effects of exercise on these measures? Put an "I" in the box that indicates the correct answer.

____4 points 3. What does "aerobic" mean? *Exercising with oxygen. Long, sustained exercise*

List 3 aerobic activities.

1. *running*
2. *jumping*
3. *swimming*

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____4 points 4. Fill in the blanks with one of the words from the list below.

List of Words

arteries	alveoli	ECG
carbon dioxide	left ventricle	sphygmomanometer
veins	right atrium	oxygen

a. The *arteries* carry blood away from the heart.

b. The *left ventricle* is the part of the heart that pumps the blood out to the body.

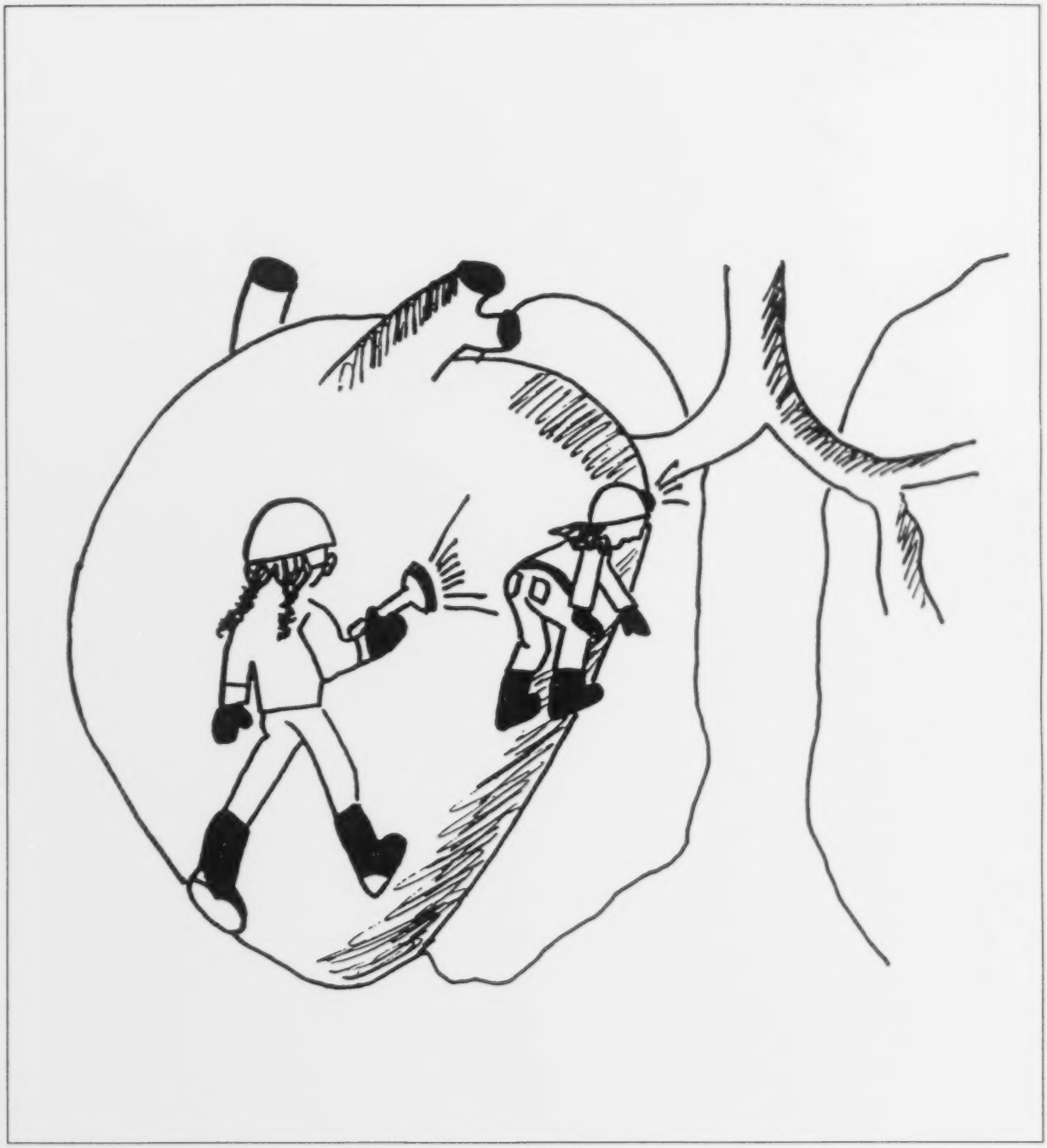
c. *carbon dioxide* is a waste product from the body cells and is exhaled through the mouth and nose.

d. A(n) *ECG* measures the electricity produced by the heart.

Aerobic Conditioning Unit Overheads

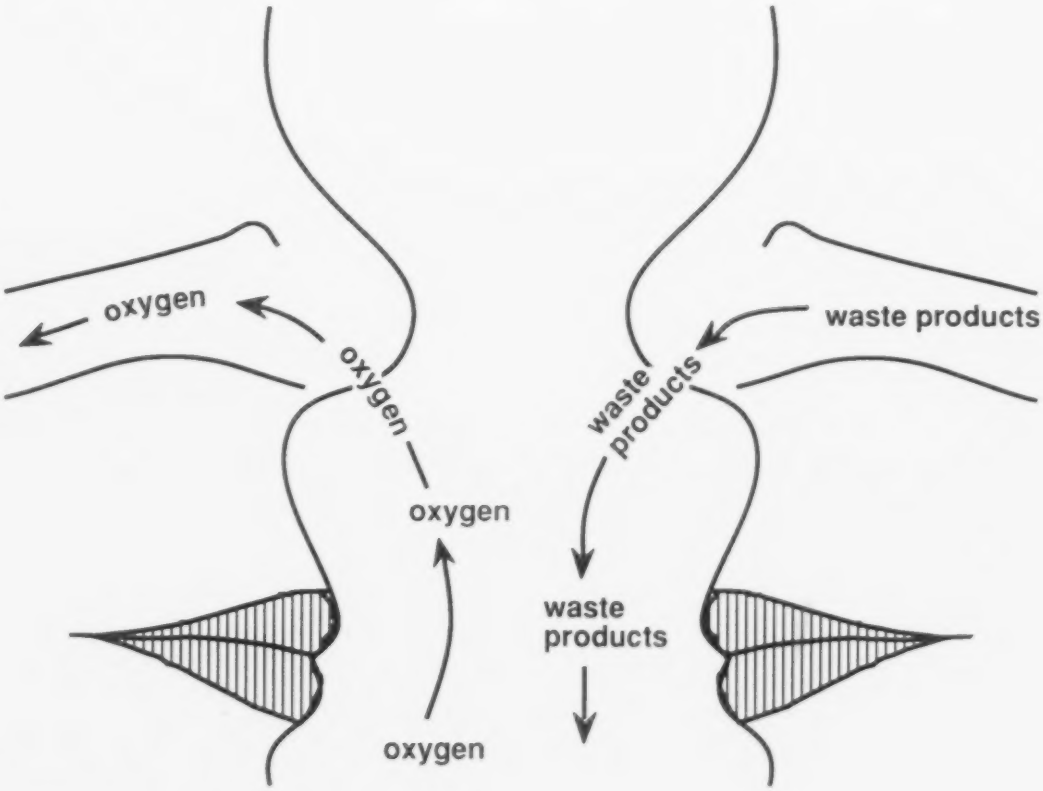
The overhead projector materials for the unit on aerobic conditioning are on the following pages. They are intended for use with the daily lesson plans. Just copy the pages you intend to use and make an overhead on the machine at your school.

#1

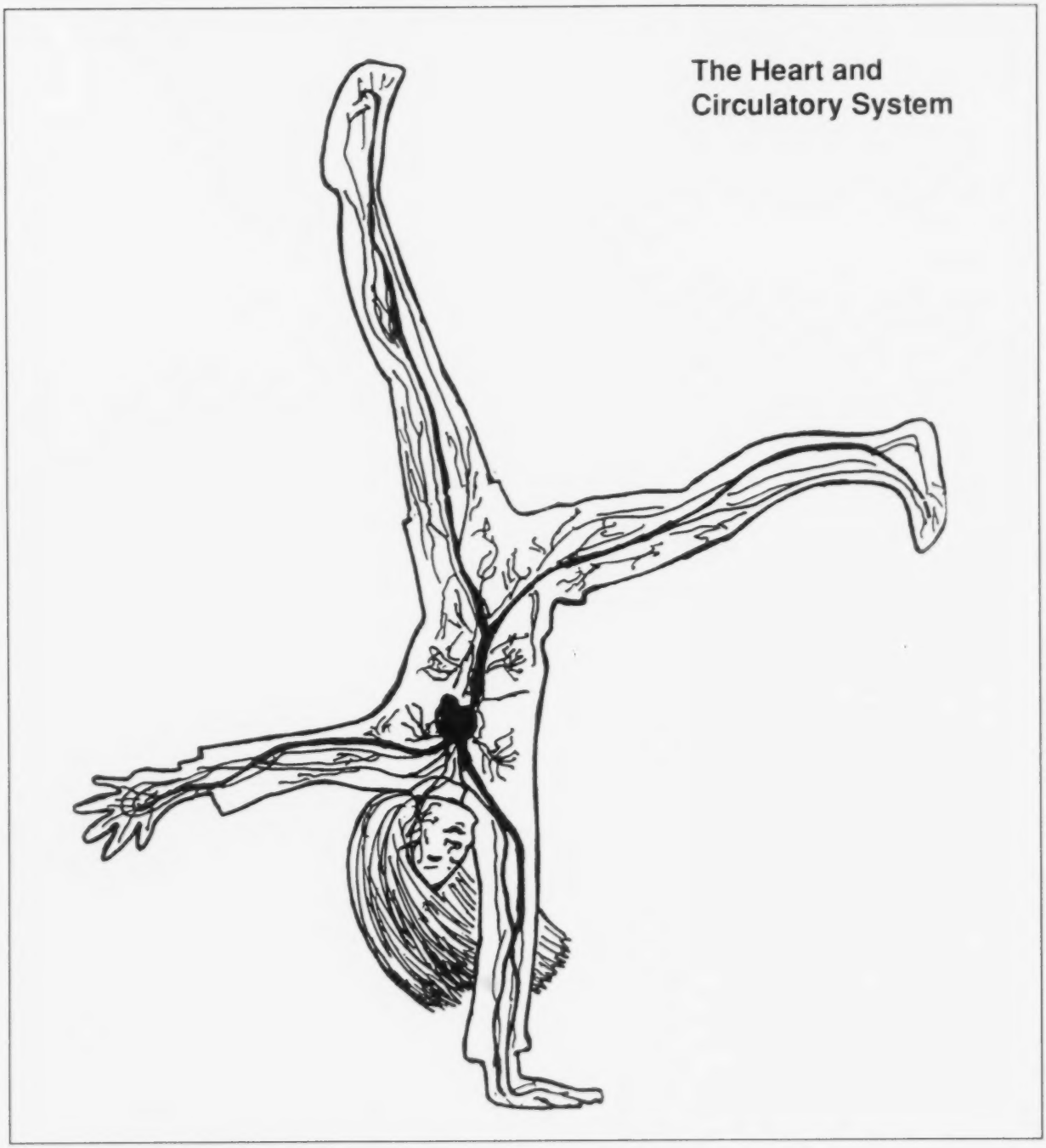


19¼

#2


oxygen
oxygen
oxygen
oxygen
waste products
waste products
waste products

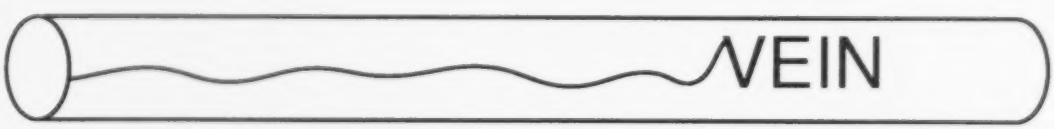
#3



#4

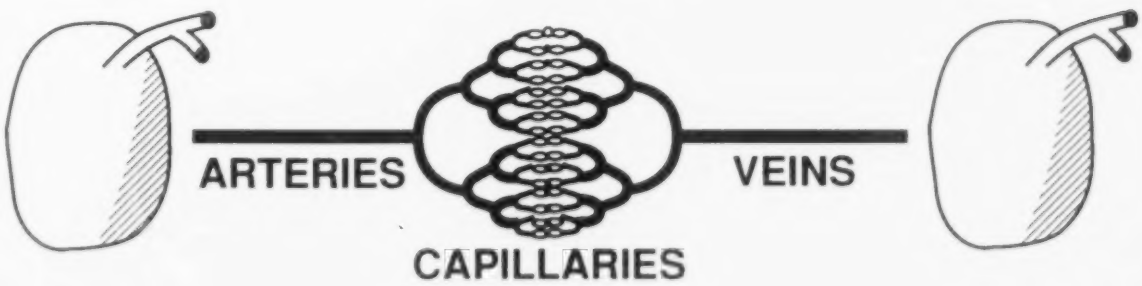
Fast and furious rush of blood

CAPILLARY



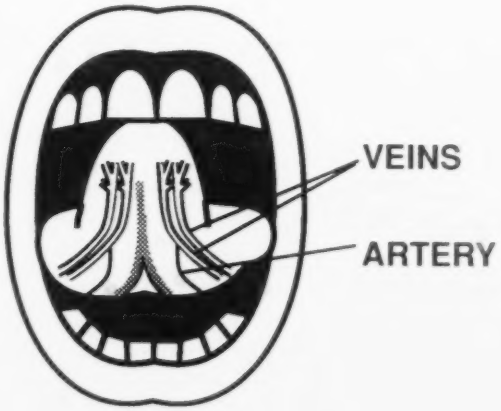
Smoother, calmer flow of blood

#5

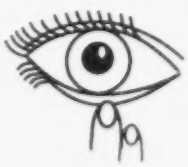


#6

UNDER YOUR TONGUE: a good place to observe living blood vessels first hand is under your tongue.



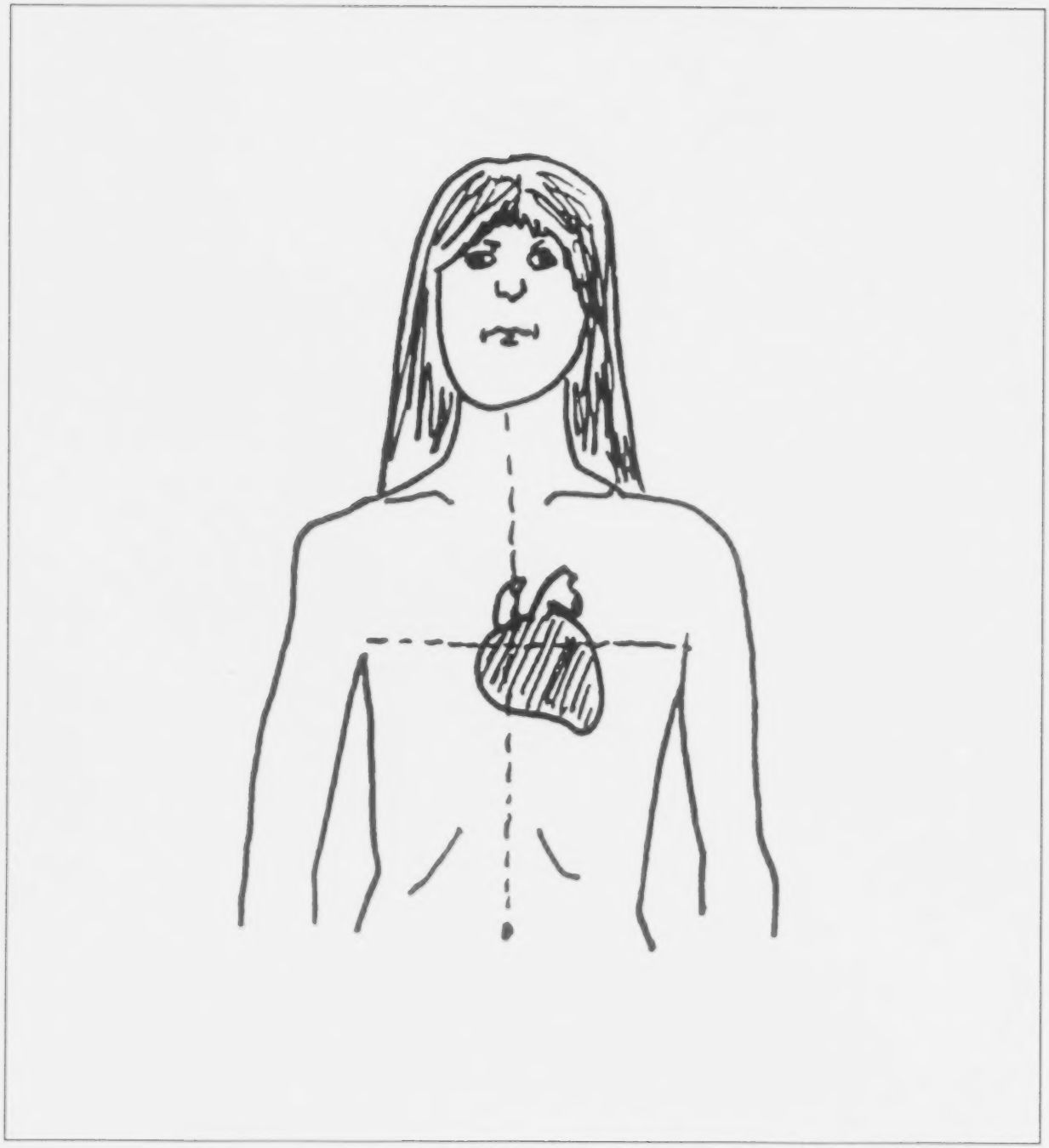
1. Use a mirror to look at the underside of your tongue.
2. Color and size will help you identify the kinds of vessels:
   THICK BLUE LINES = VEINS
   THICK PINK LINES = ARTERIES
   TINY HAIR LINES = CAPILLARIES
3. Another good place for seeing capillaries is in the fold under your eye.



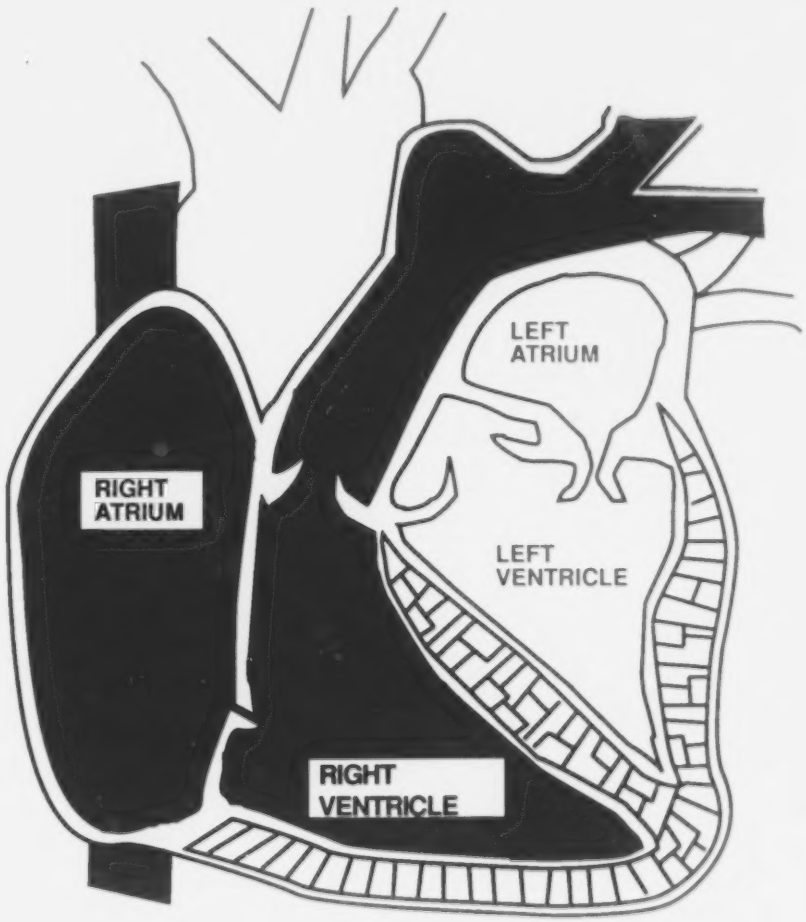
Tennis Ball Squeeze Try to do a heart's work with your hand. Test the ease with which you can squeeze, and get a grasp of this mighty muscle.

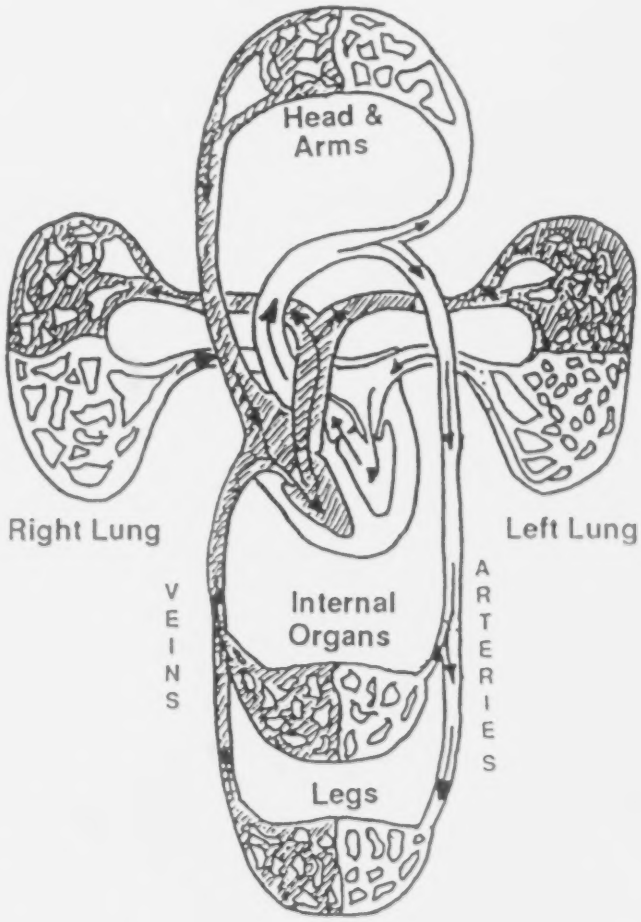
1. The force needed to squeeze a tennis ball is similar to the force needed to squeeze blood out of the heart.

2. If you squeeze 60x a minute (a normal pulse), you will get a good idea of how hard the heart works.



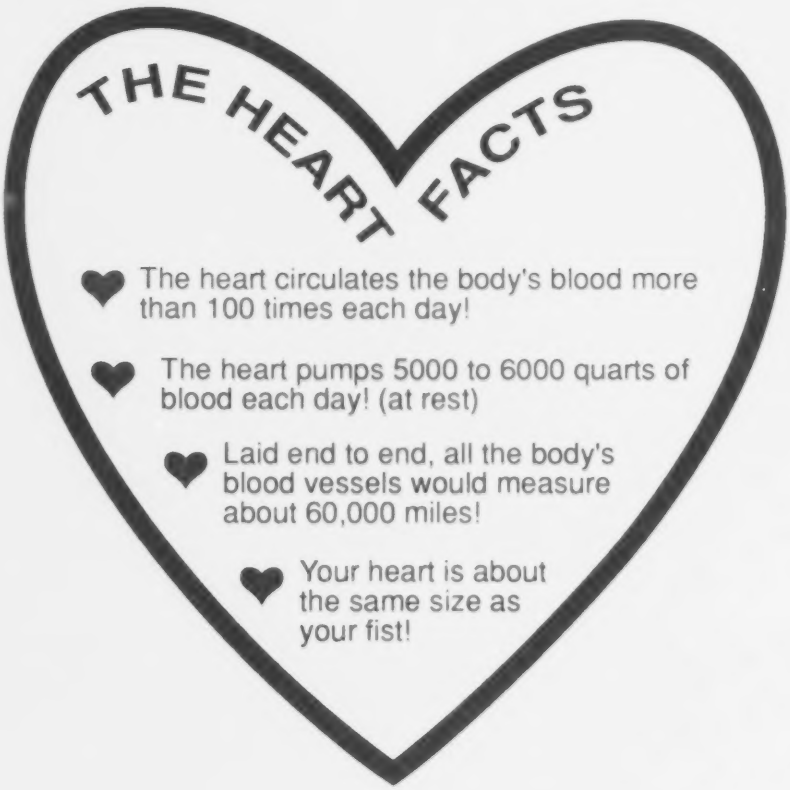
#9

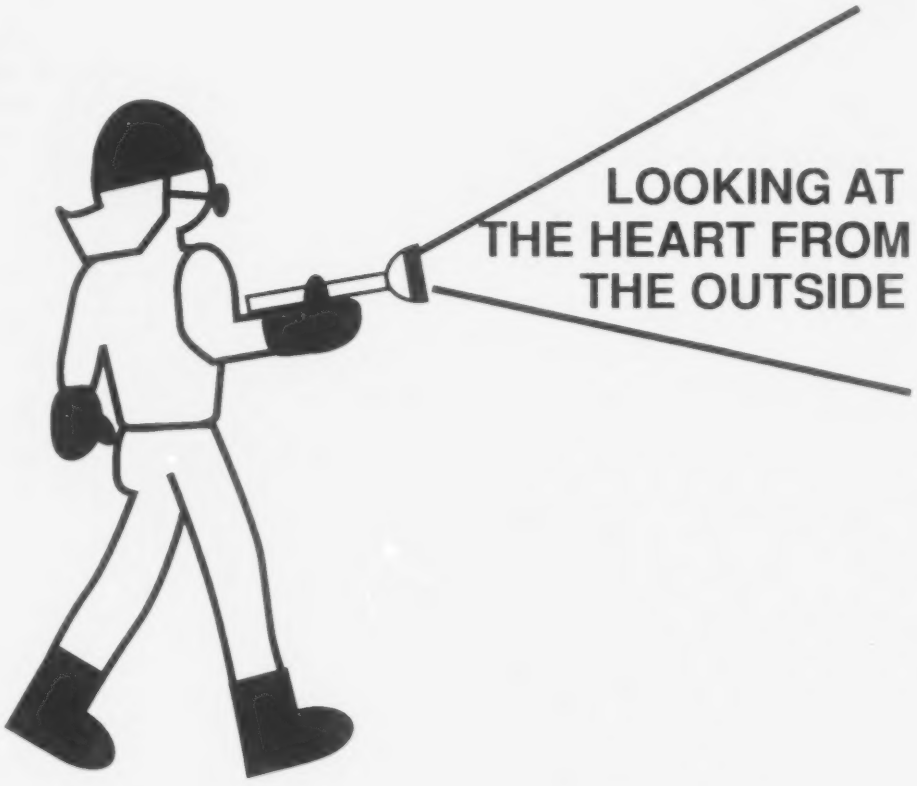

LEFT
ATRIUM
RIGHT
ATRIUM
LEFT
VENTRICLE
RIGHT
VENTRICLE


Head &
Arms
Right Lung
Left Lung
VEINS
Internal
Organs
ARTERIES
Legs

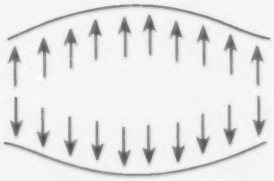
#11

THESE ARE:

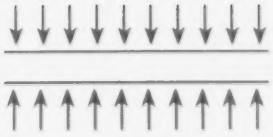

THE HEART FACTS
The heart circulates the body's blood more than 100 times each day!
The heart pumps 5000 to 6000 quarts of blood each day! (at rest)
Laid end to end, all the body's blood vessels would measure about 60,000 miles!
Your heart is about the same size as your fist!


LOOKING AT
THE HEART FROM
THE OUTSIDE

MEASURING YOUR PULSE

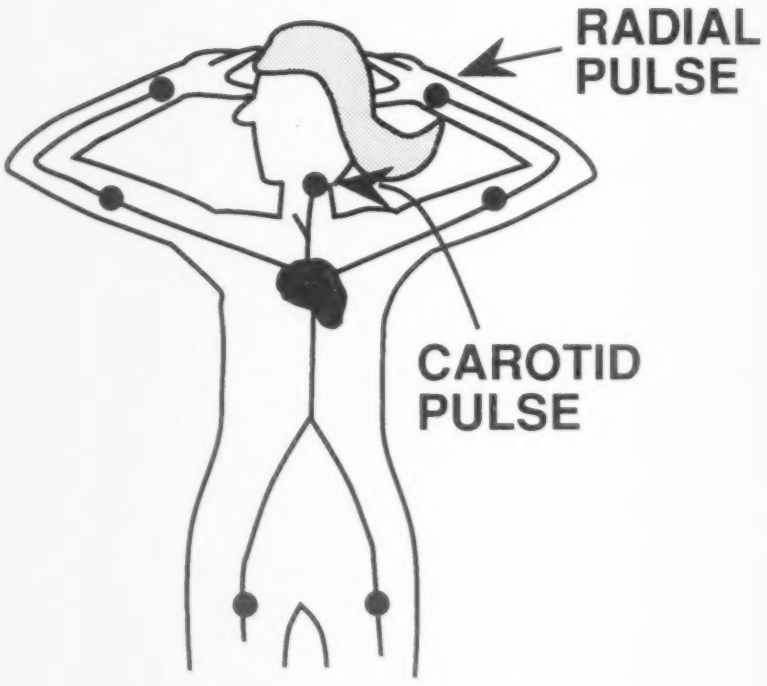


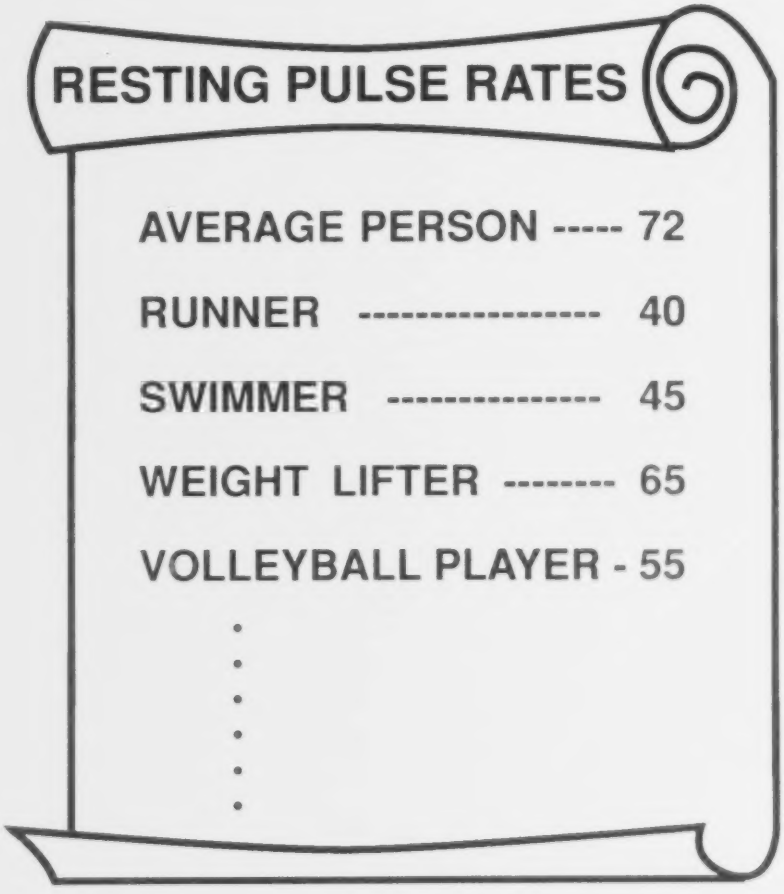
Heart contracts → arteries stretch



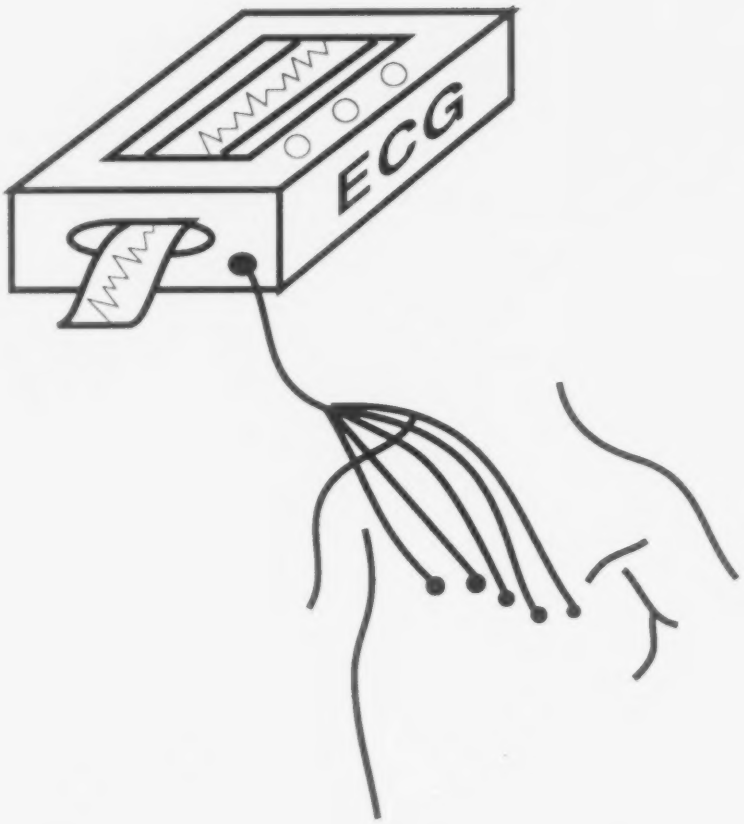
Heart relaxes → arteries contract

PULSE POINTS



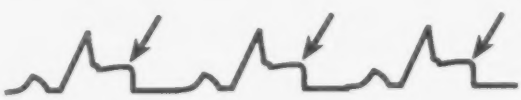

RESTING PULSE RATES
AVERAGE PERSON ----- 72
RUNNER ---------- 40
SWIMMER ---------- 45
WEIGHT LIFTER -------- 65
VOLLEYBALL PLAYER - 55

#16



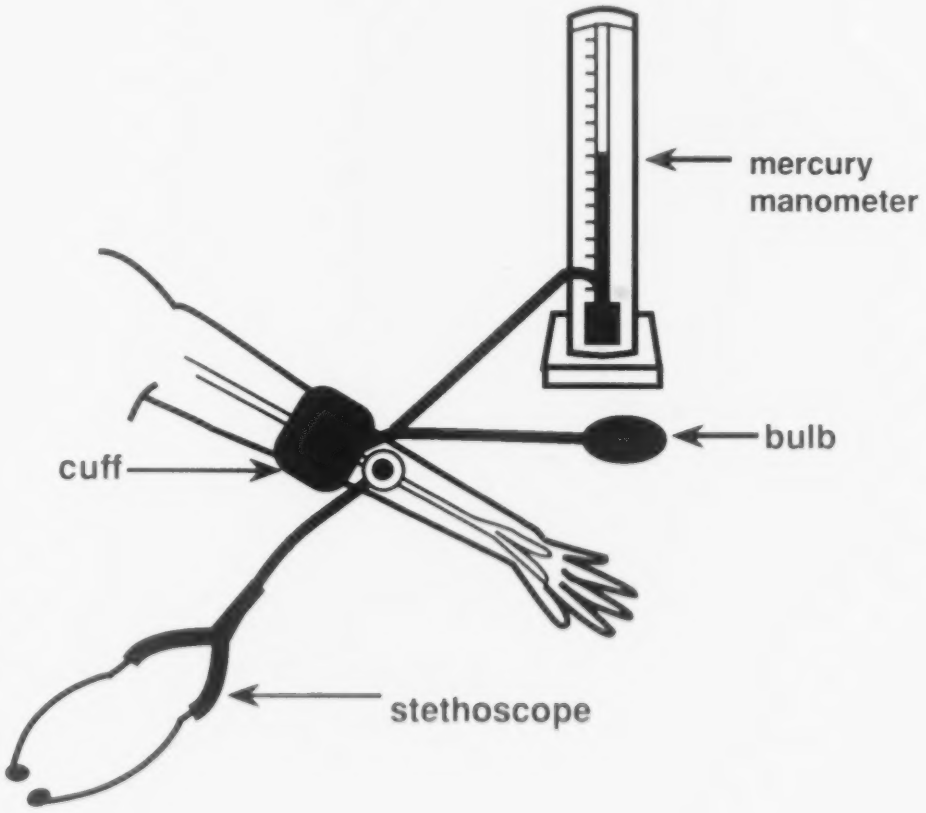
Electrodes picking up the electricity in the heart.

= **A Normal ECG**

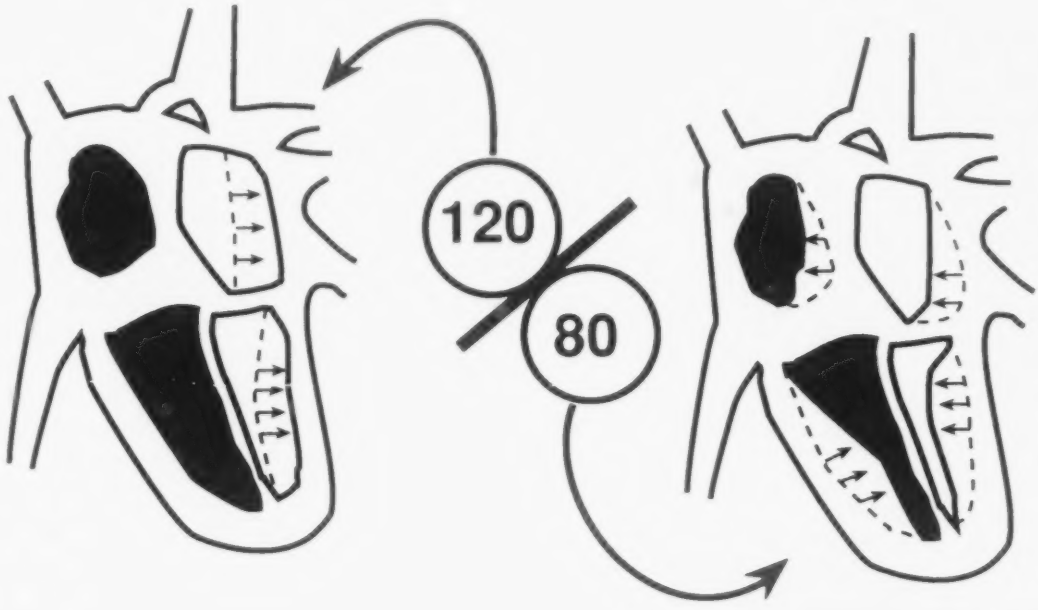


= **Evidence of a Heart Attack**

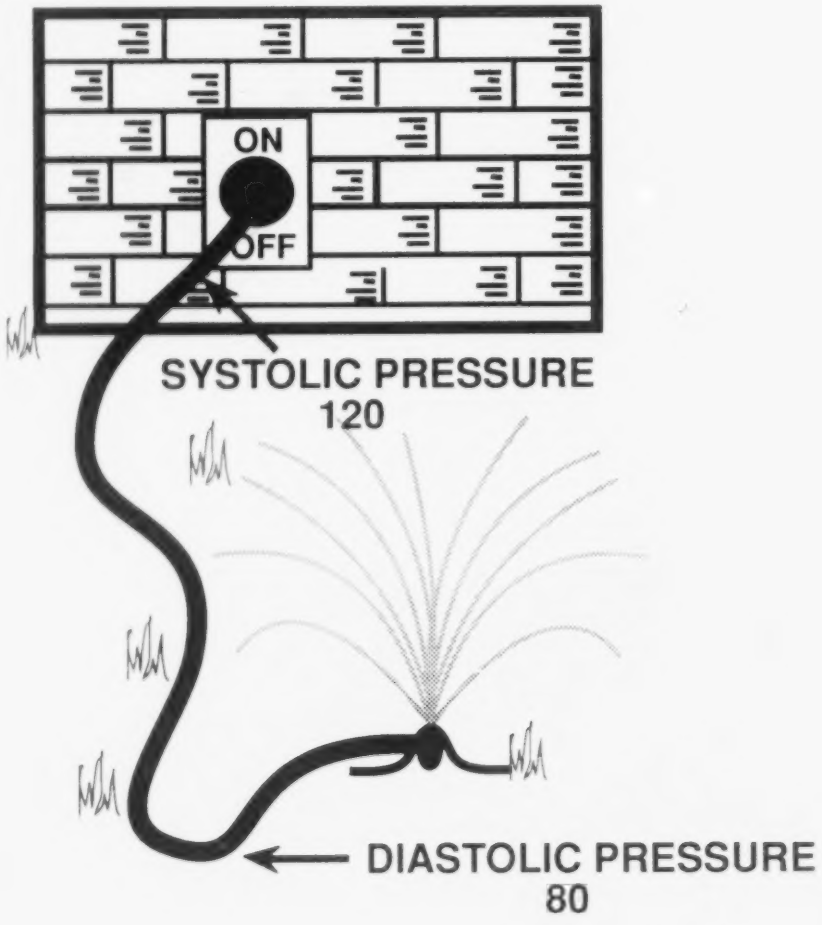
=Heart disease in the left atrium. Could be valves, hypertension, or heart disease

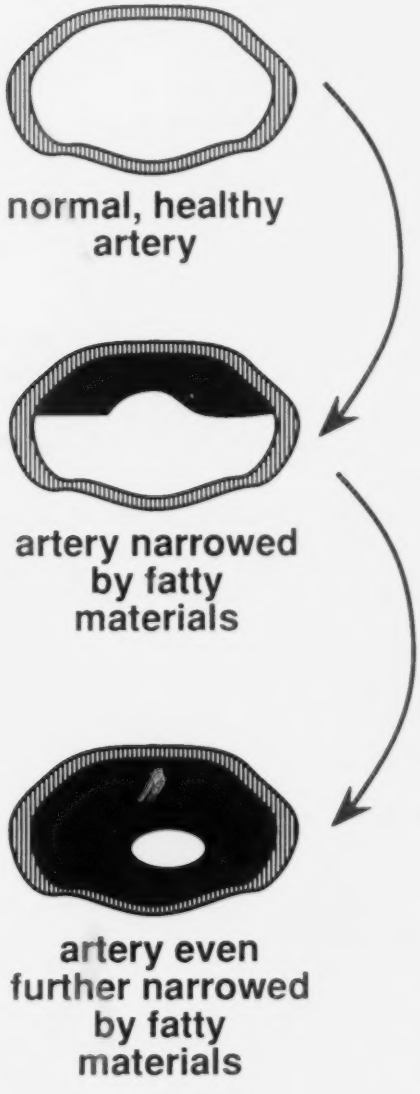


#19



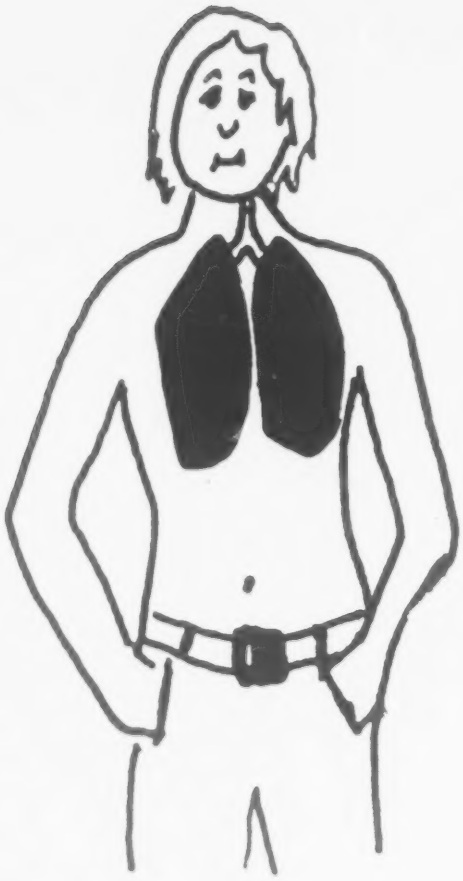
#20


ON
OFF
SYSTOLIC PRESSURE
120
DIASTOLIC PRESSURE
80

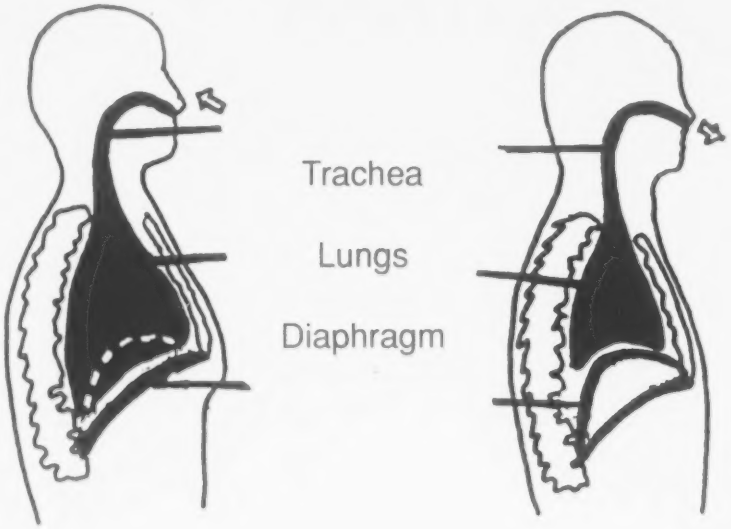

normal, healthy artery
artery narrowed by fatty materials
artery even further narrowed by fatty materials

#22

The Lungs and Respiratory System

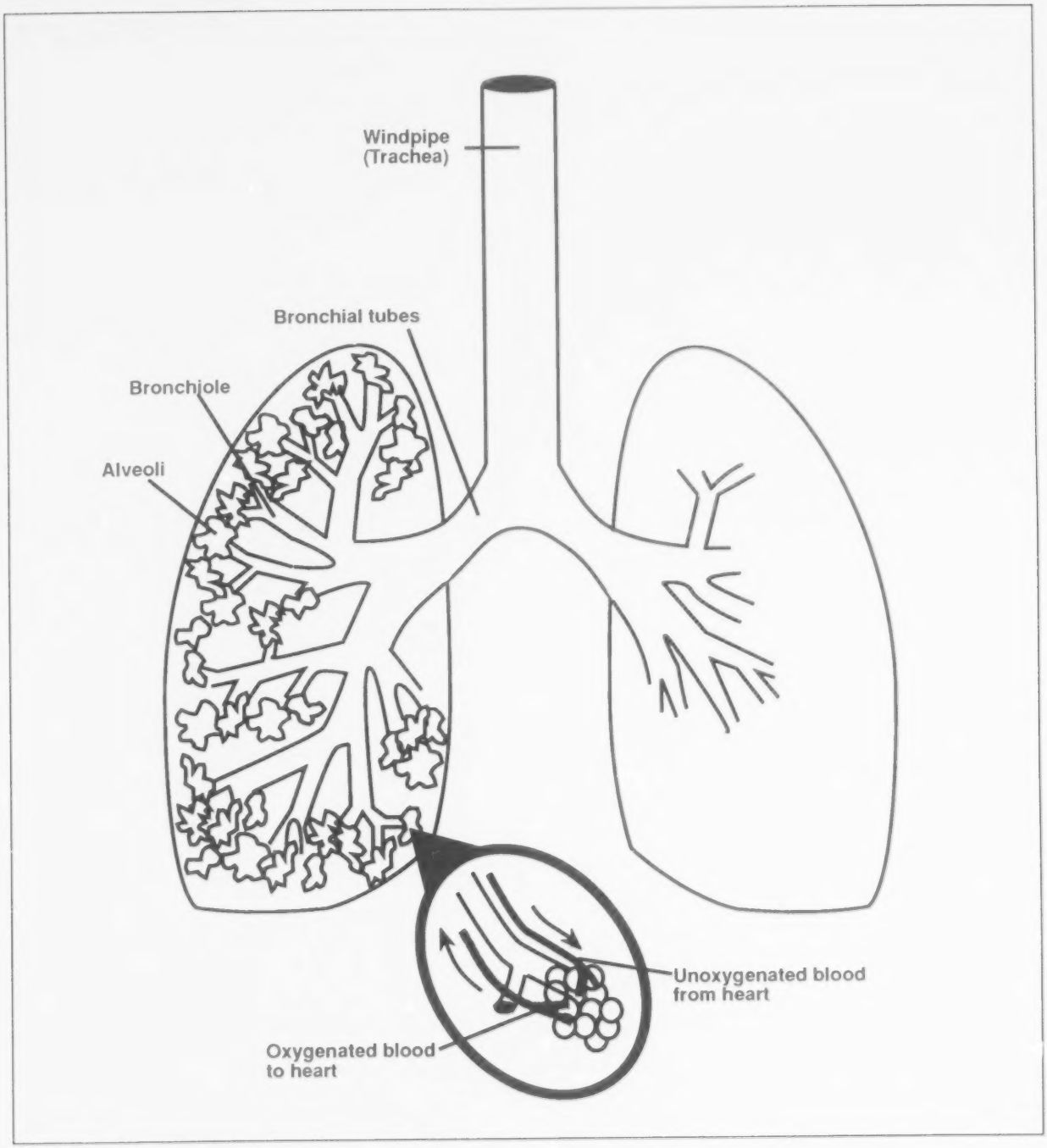


#24



Breath In
diaphragm—contracts
ribs—outward
space—bigger

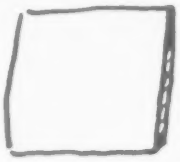
Breath Out
diaphragm—relaxes
ribs—inward
space—smaller

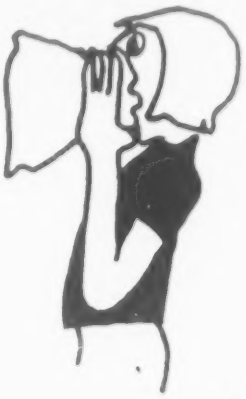

Windpipe
(Trachea)
Bronchial tubes
Bronchiole
Alveoli
Unoxygenated blood
from heart
Oxygenated blood
to heart

#26

In the Bag—A good way to prove that something is happening to the air you breathe is to try breathing it several times. If it becomes unbreathable then you can be certain some changes are happening within your lungs.

CAUTION: breath is a matter of life and death. Try this experiment *once*, then discard the plastic bag.





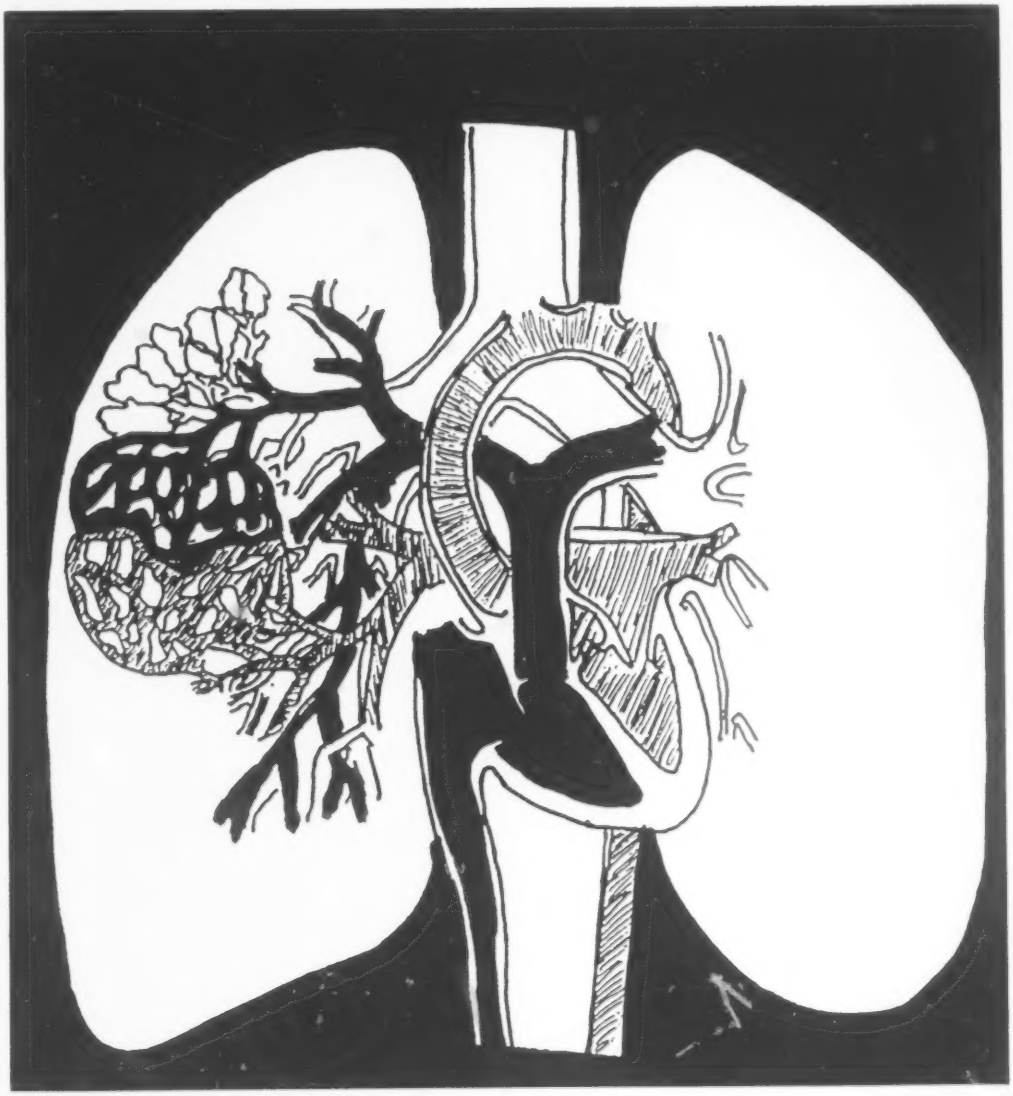
1. Use a small plastic bag.
2. Breathe into the bag once.
3. How many times can you inhale the same breath before it gets uncomfortable? *Stop* before it does!
4. Knot the bag so that the exhaled gas can't escape.

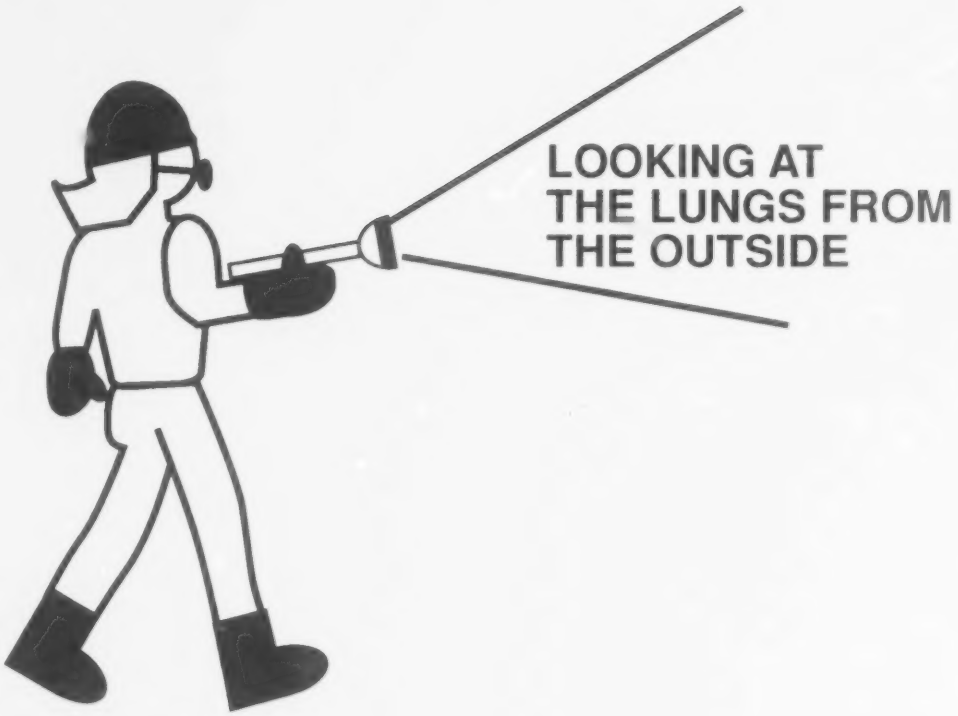
Lung Exhaust—What goes in doesn't necessarily come out. There are changes happening to the air you breathe, changes you can't see or feel. You can test your lung exhaust by comparing it to a bag of air the same size.

1. Carefully pour a bag of air over a burning candle.

2. Carefully pour your bag of exhaust over a burning candle.

Putting it Together

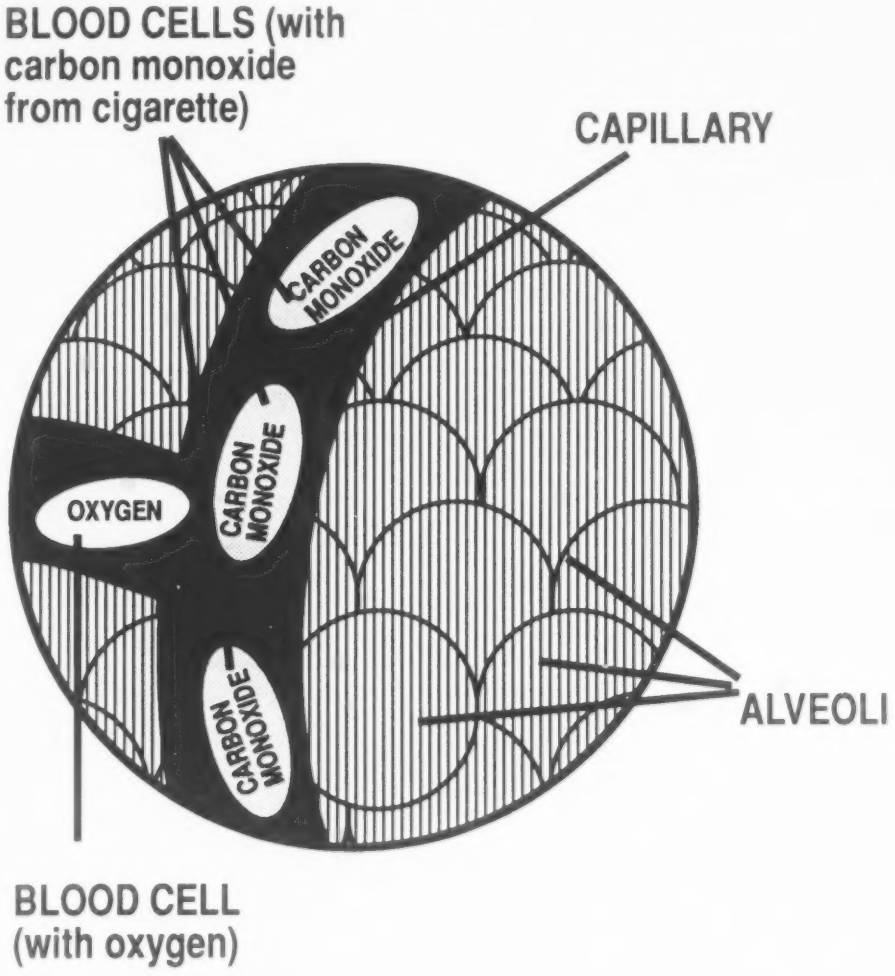


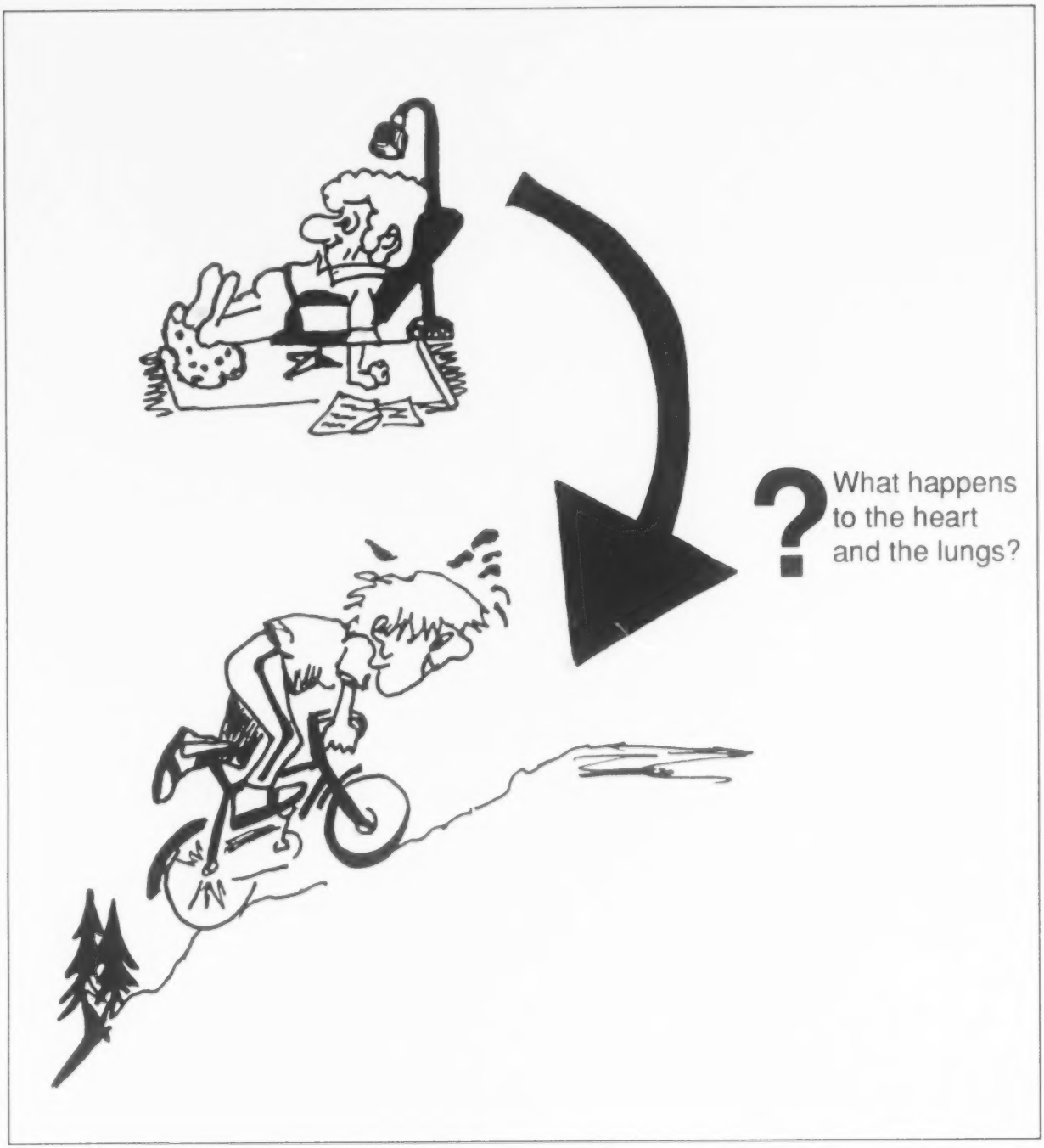

LOOKING AT
THE LUNGS FROM
THE OUTSIDE

TIDAL VOLUME (Amount of air in each breath)	**BREATHING RATE** (Number of breaths per minute)	**TOTAL AIR** (Amount of air into lungs per minute)
1/2 Quart	**12**	**6 Quarts**

147

#31


BLOOD CELLS (with carbon monoxide from cigarette)
CAPILLARY
CARBON MONOXIDE
CARBON MONOXIDE
OXYGEN
CARBON MONOXIDE
ALVEOLI
BLOOD CELL (with oxygen)



149

#33

HEART

		REST	EXERCISE
IMMEDIATE EFFECTS	HEART RATE		
	BLOOD PRESSURE		

LONG-TERM EFFECTS

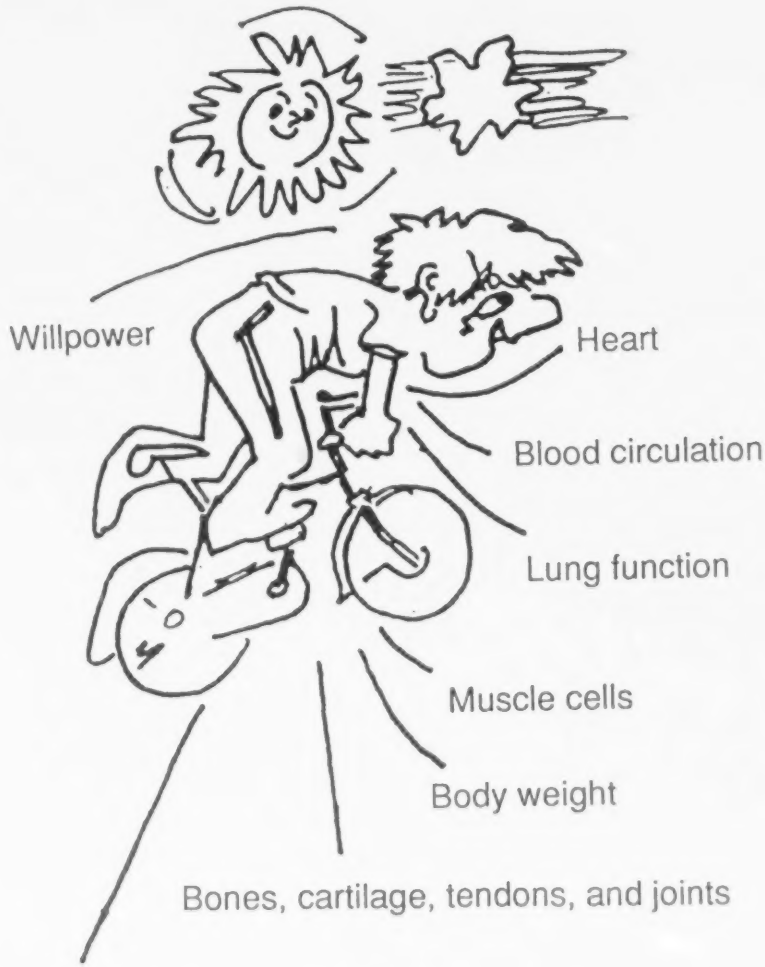
1. Heart becomes stronger-pumps more blood with each beat.
2. Slower heart rate at rest.
3. Heart rate recovers faster to normal after exercise.
4. Increase in size and number of capillaries in heart.

LUNGS

		REST	EXERCISE
IMMEDIATE EFFECTS	BREATHING RATE		
	TIDAL VOLUME	1/2 quart	
	TOTAL AIR		

LONG-TERM EFFECTS

1. Respiratory muscles stronger—more air with each breath.
2. Increases in size and number of capillaries in lungs.
3. Greater number of alveoli begin working.
4. Breathing rate returns to normal more quickly.



Protection from cardiovascular diseases

From Stromme & Skard: *Physical Fitness Testing* p. 11

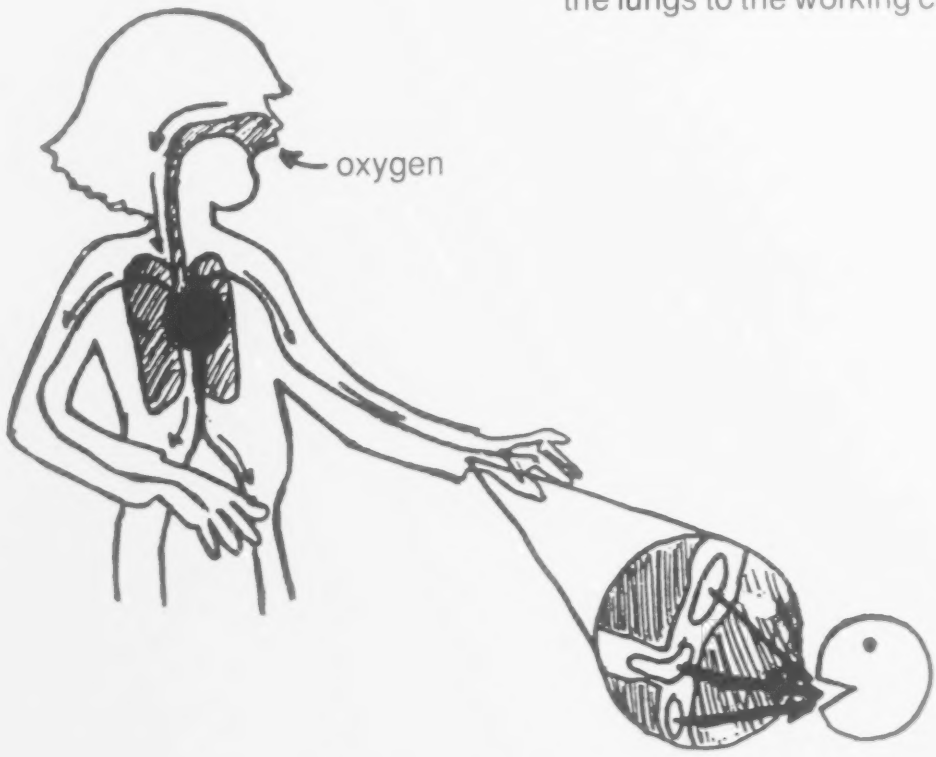
#36

Designing a Safe and Effective Exercise Program

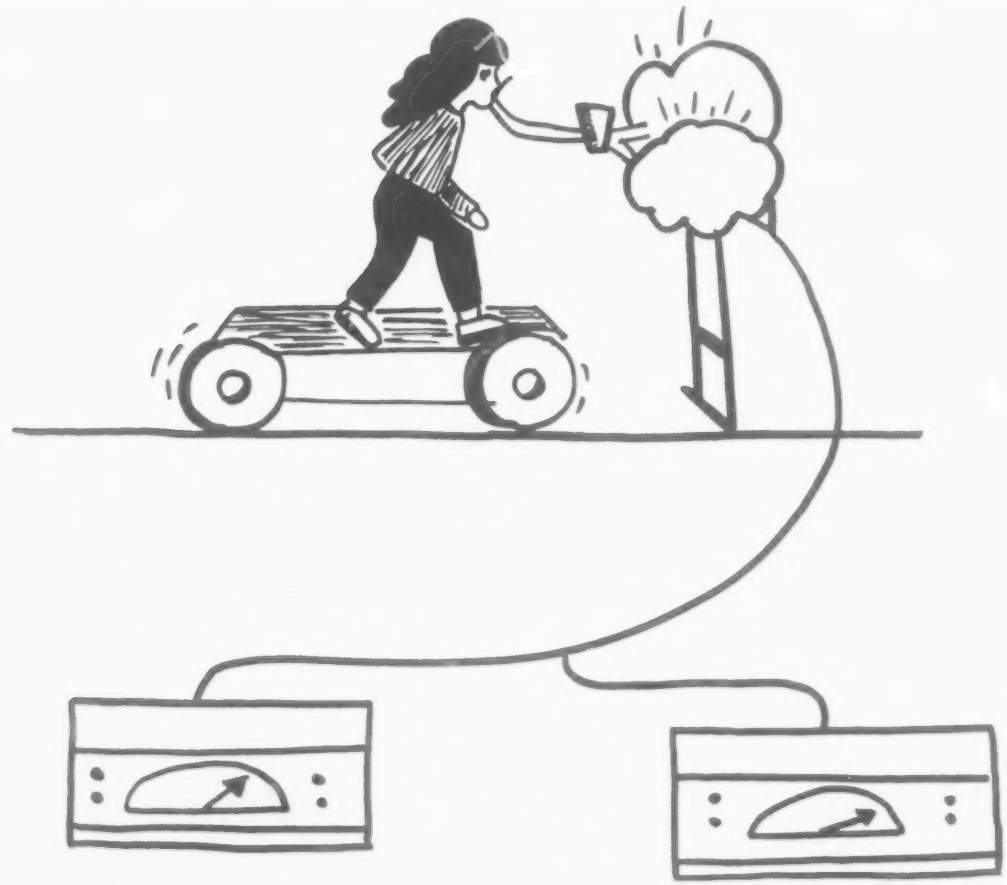
TYPE

#39

VO_2 max = the total amount of oxygen that travels from the lungs to the working cells

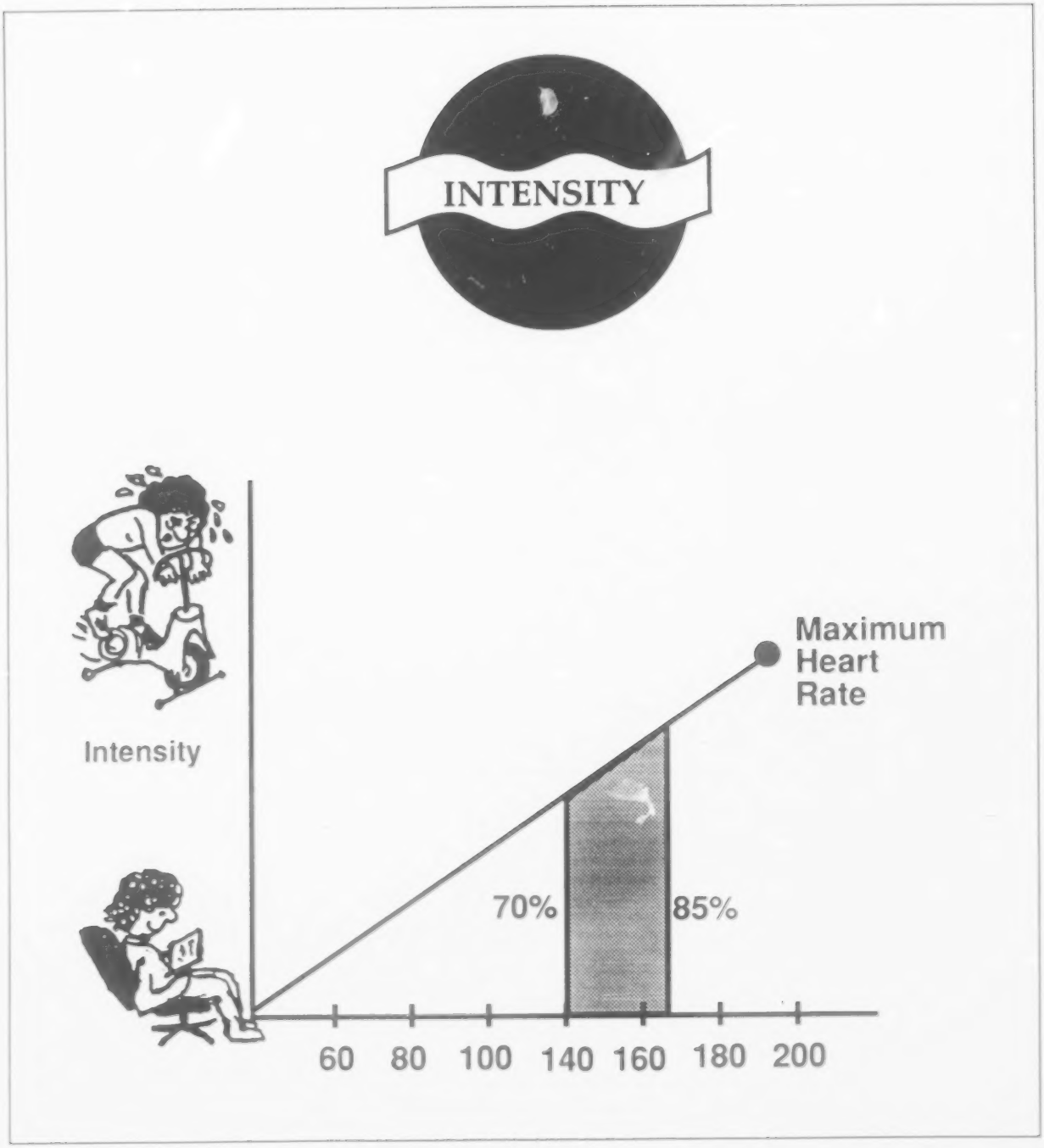


cell eating oxygen from blood

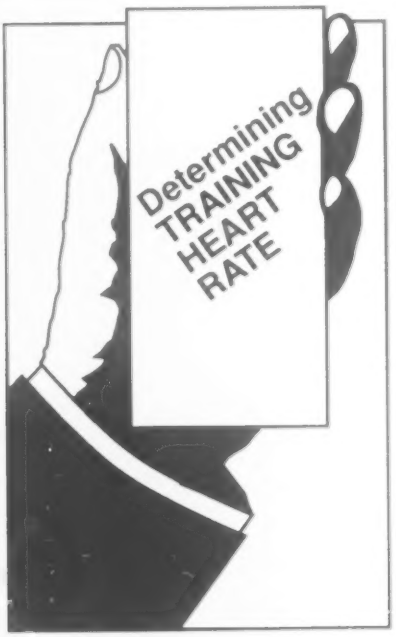


a) A large quantity of oxygen indicates what?
b) A small quantity of oxygen indicates what?

#41


INTENSITY
Intensity
Maximum
Heart
Rate
70%
85%
60
80
100
140
160
180
200

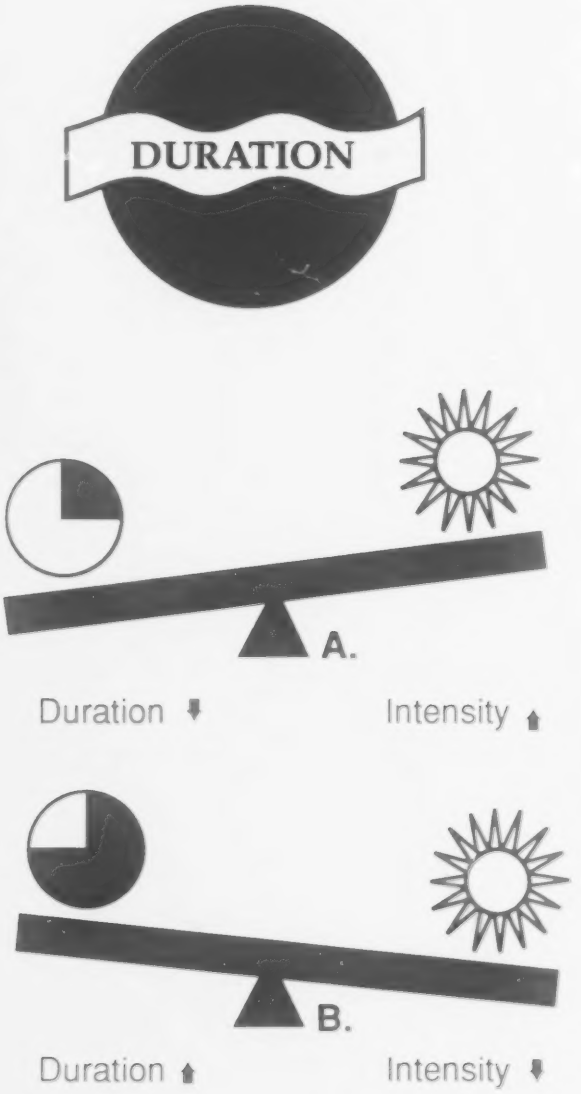
#42



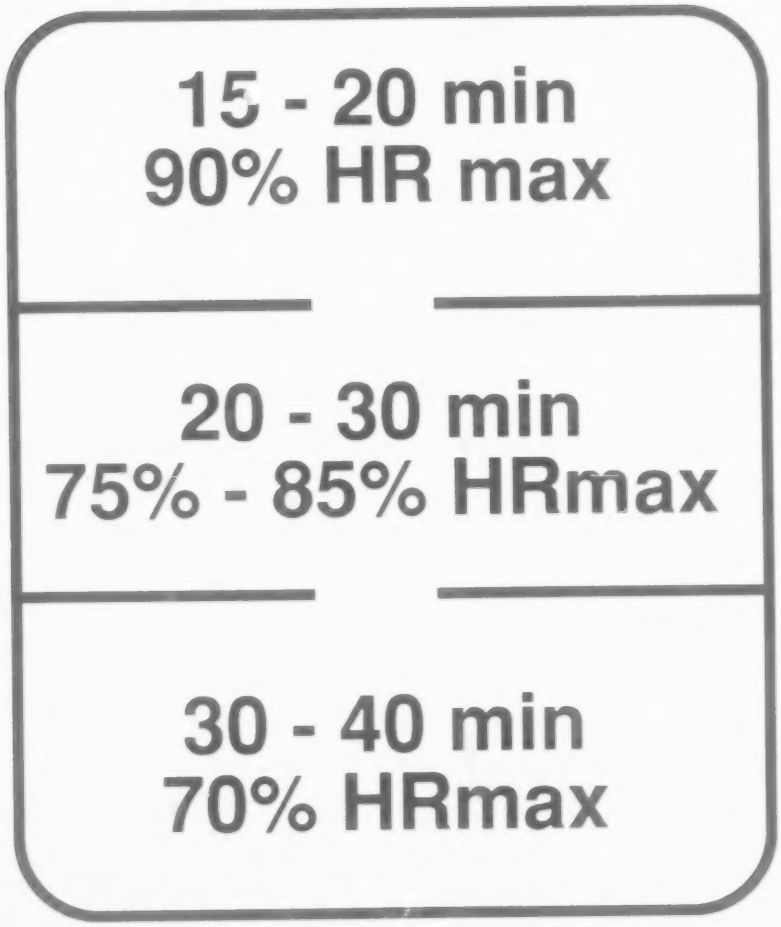
1. **determine HR MAX:**
   220-age=HR MAX

2. **determine HR REST:**
   count pulse for 1 minute

3. **determine HR TRAINING:**
   (HR MAX - HR REST) x
   (conditioning intensity) +
   HR REST



#44


15 - 20 min
90% HR max
20 - 30 min
75% - 85% HRmax
30 - 40 min
70% HRmax

FREQUENCY

RULE OF THUMB:

3-4 Days per week

TYPE: Aerobic
INTENSITY: 70-85% HRmax
DURATION: 20-40 Min/70-80% HRmax
FREQUENCY: 3-4 Days per week

Handicapping Conditions Unit: Pre/Posttest

Below is a pre/posttest for the unit on disabling conditions. Your students' scores on this test will not reflect how they will perform in the PACP, but it may help you determine whether or not they have a better understanding of disabling conditions.

NAME_____ DATE_____

____5 points 1. Indicate whether the following statements are true or false by marking a "T" if the statement is TRUE or an "F" if the statement is FALSE.

T In ancient Greece and Rome, a child born with a disability was immediately put to death.

T A child with cerebral palsy has trouble controlling her muscles.

F A person who is mildly retarded will never have a job.

F People who are blind are born with a better sense of smell and touch.

F Children with autism are happiest when they are with other people.

____2 points 2. Sally is a student who is unable to control the muscles around her mouth. Describe a technique (one we discussed in class) that Sally could use to communicate with her teacher.

Direct selection, scanning.

List one disadvantage to the technique you described above

Direct selection/scanning: slow; requires constant attention by message receiver; requires equipment

____2 points 3. Define PROSTHESIS *A tool needed by a person with disabilities in order to do something*

Give an example of a prosthesis and tell how it is used.

glasses: help a person to see

____3 points 4. Read the list below. Put an "X" beside the items that are contagious (that is - those that can be caught from someone else like a cold).

____blindness

____autism

____mental retardation

X measles

____cerebral palsy

X mumps

X chicken pox

____deafness

____3 points 5. Read the list below. Put an "X" beside the examples of persons who would be considered handicapped.

X A politician who is afraid to speak in front of a large group

X A person who weighs 100 pounds and wants to play professional football

____A person who is 7 feet 8 inches tall and wants to play basketball

X An opera singer with a sore throat

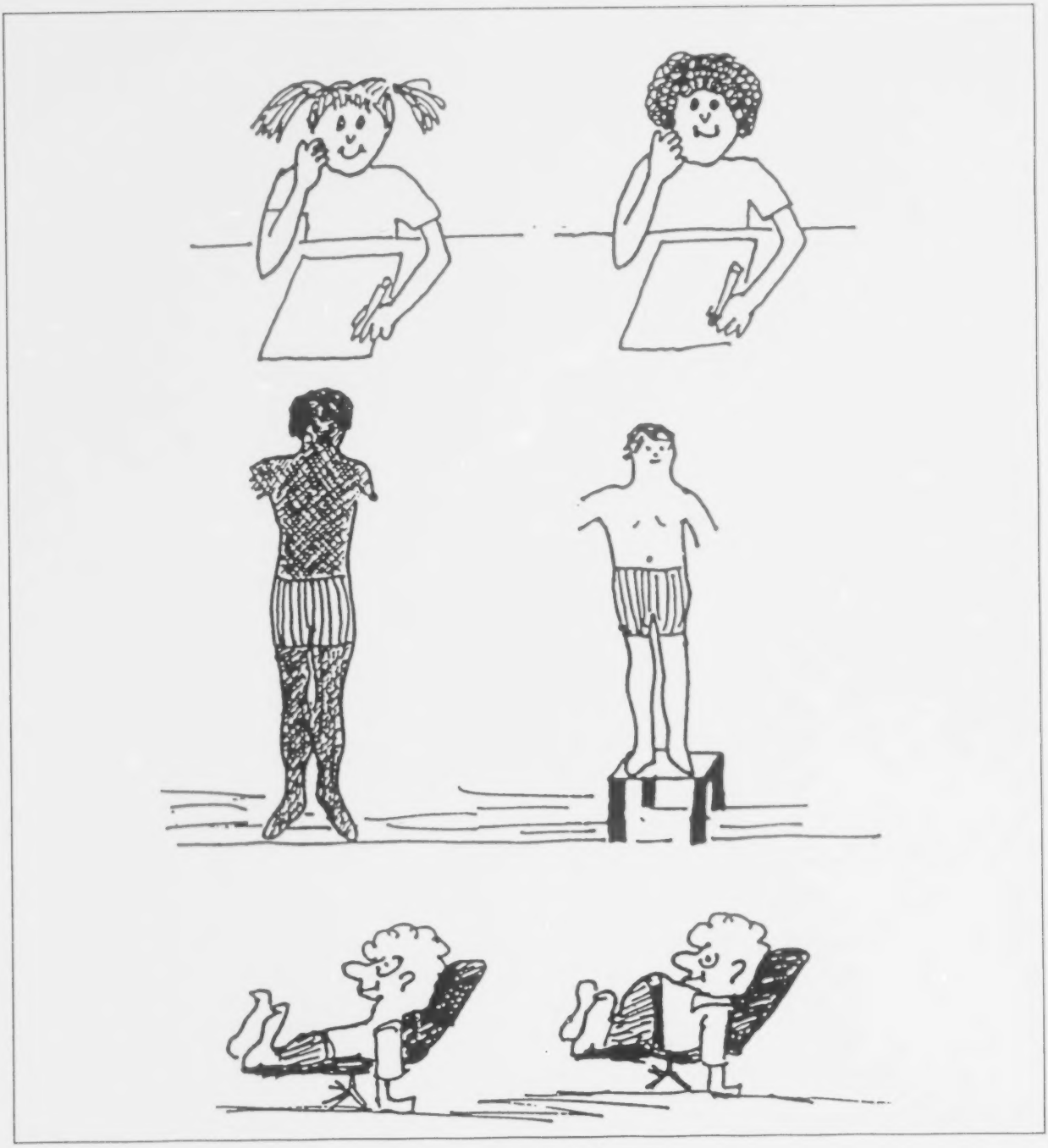
____An artist with a broken leg

Handicapping Conditions Unit Overheads

The overhead projector materials for the unit on disabling conditions are on the following pages. They are intended for use with the daily lesson plans. Just copy the pages you intend to use and make an overhead on the machine at your school.

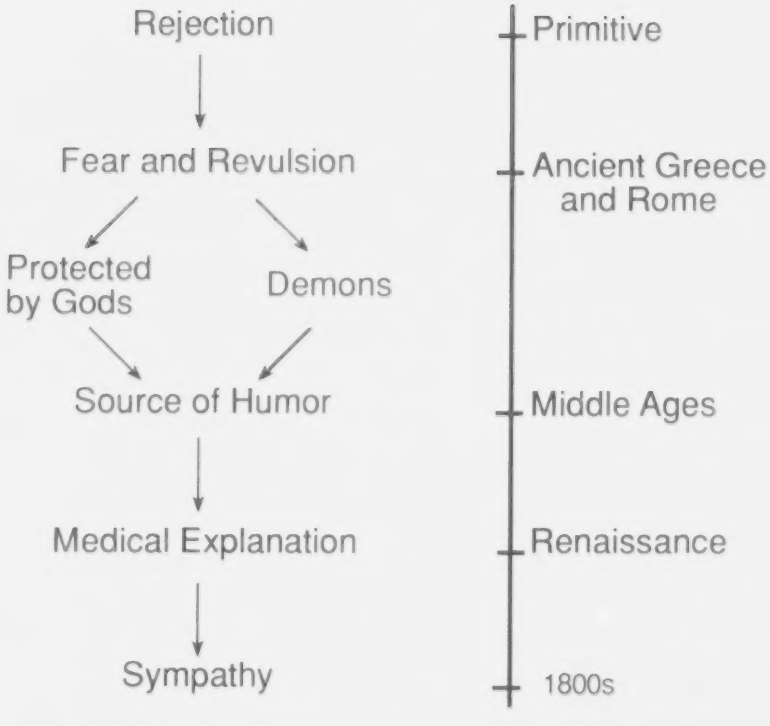
INDIVIDUAL DIFFERENCES

Characteristics that make us unique...

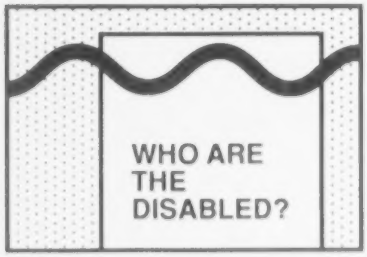


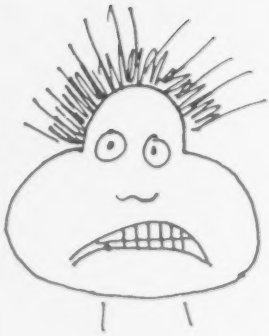
#49

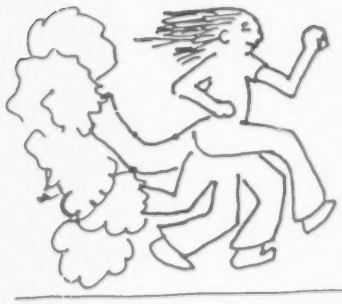
#50


Rejection
Fear and Revulsion
Protected by Gods
Demons
Source of Humor
Medical Explanation
Sympathy
Primitive
Ancient Greece and Rome
Middle Ages
Renaissance
1800s

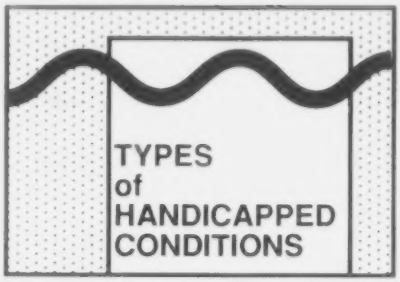
#51


WHO ARE
THE
DISABLED?



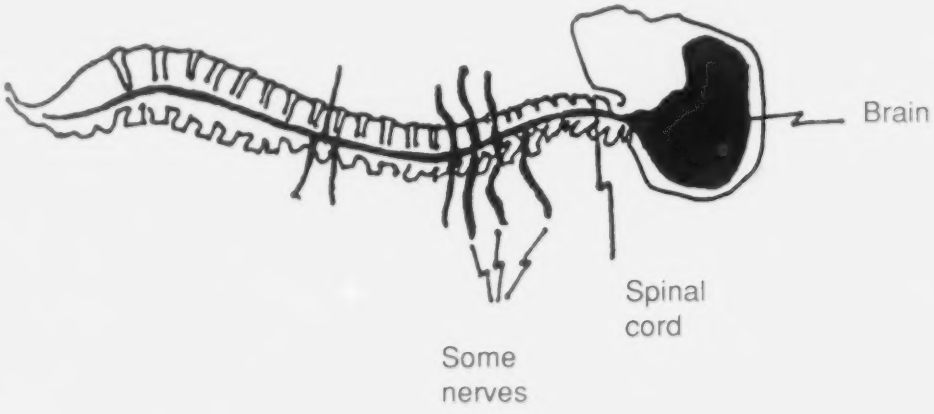


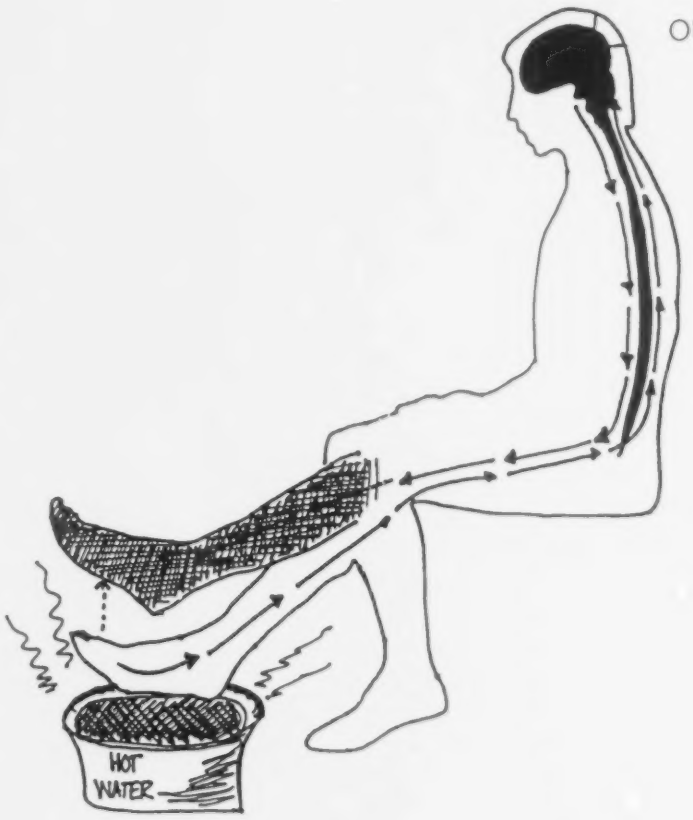
#53



1. Sensory Impairments
2. Orthopedic Handicaps
3. Mental Retardation
4. Emotional Health Problems

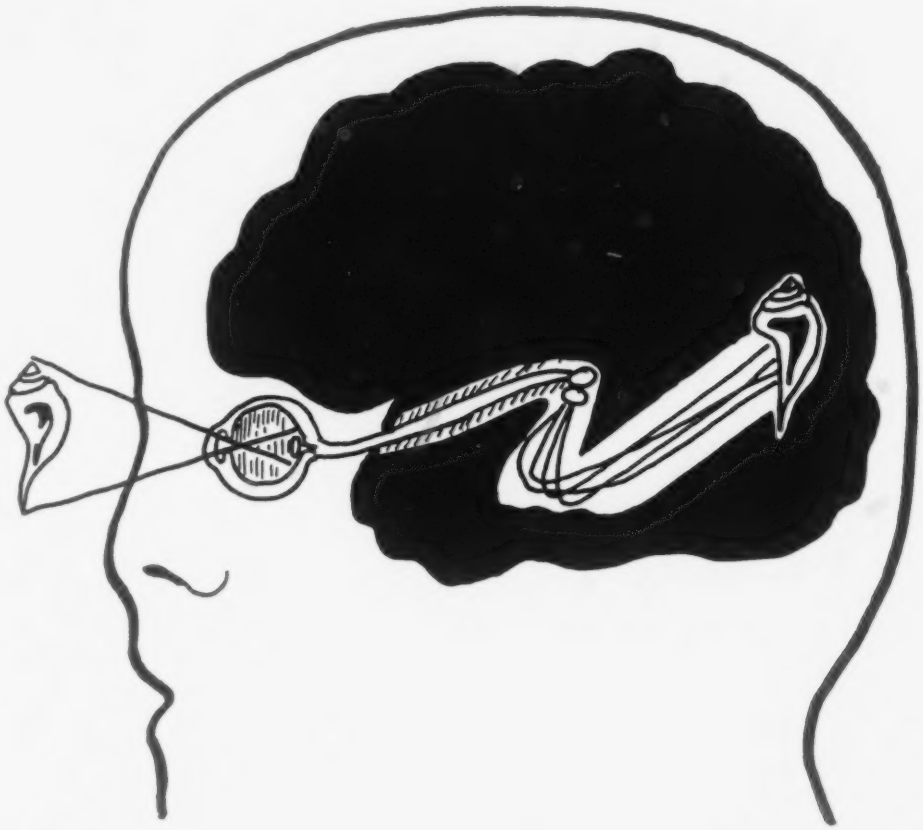
The Nervous System





#56

Sensory Impairment

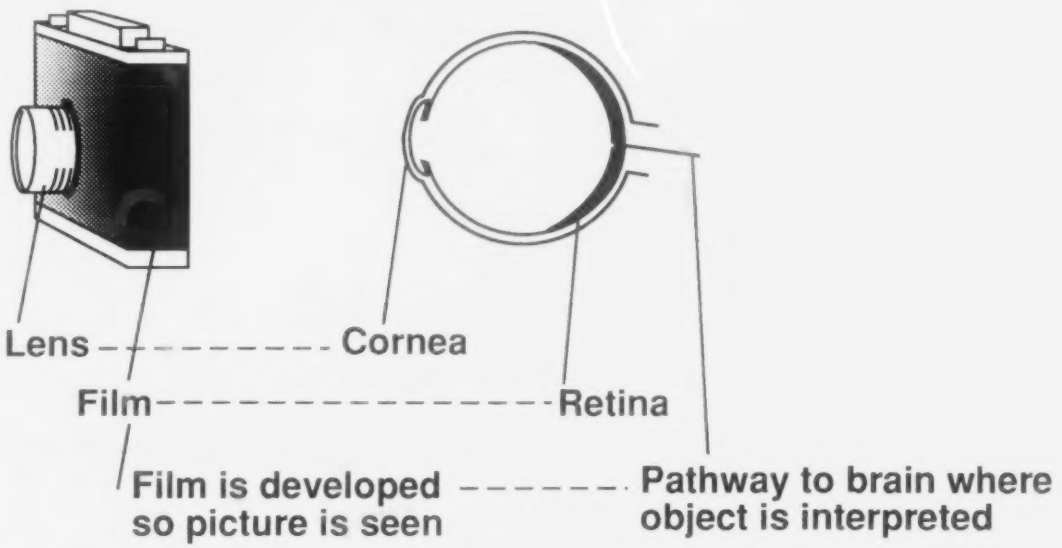


Receiving station

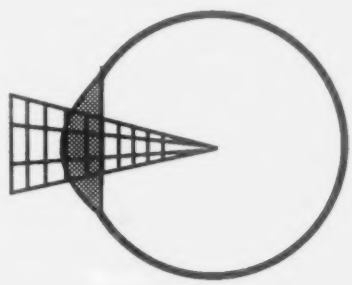
Visual pathway

Within brain

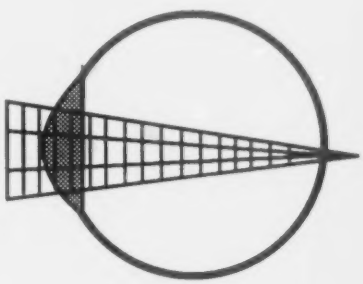
#57


Lens
Cornea
Film
Retina
Film is developed so picture is seen
Pathway to brain where object is interpreted

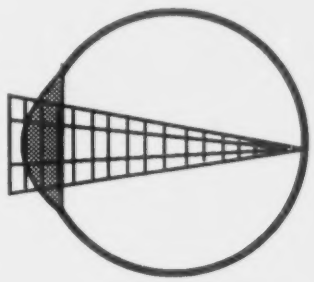
#58



Nearsighted Vision

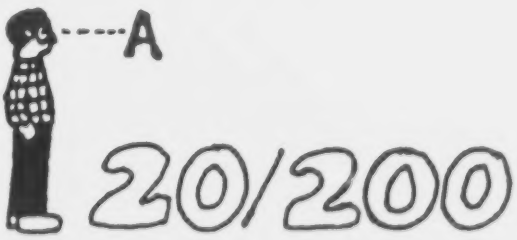


Farsighted Vision



Normal Vision

#59

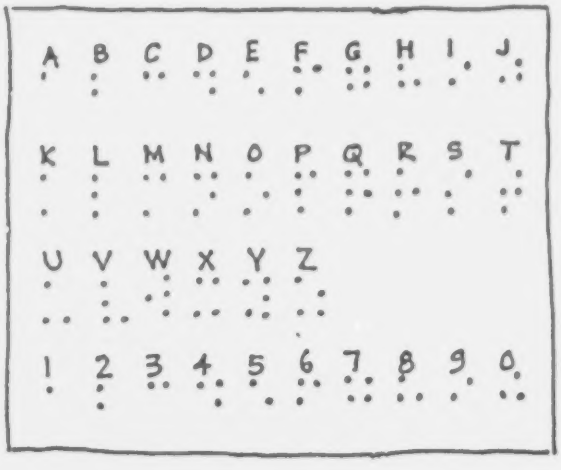


From: Kalem, J. *What if You Couldn't . . .*

#60

Regular print books are often printed in a type this size.

Large print books are often printed in a type this size.



#61

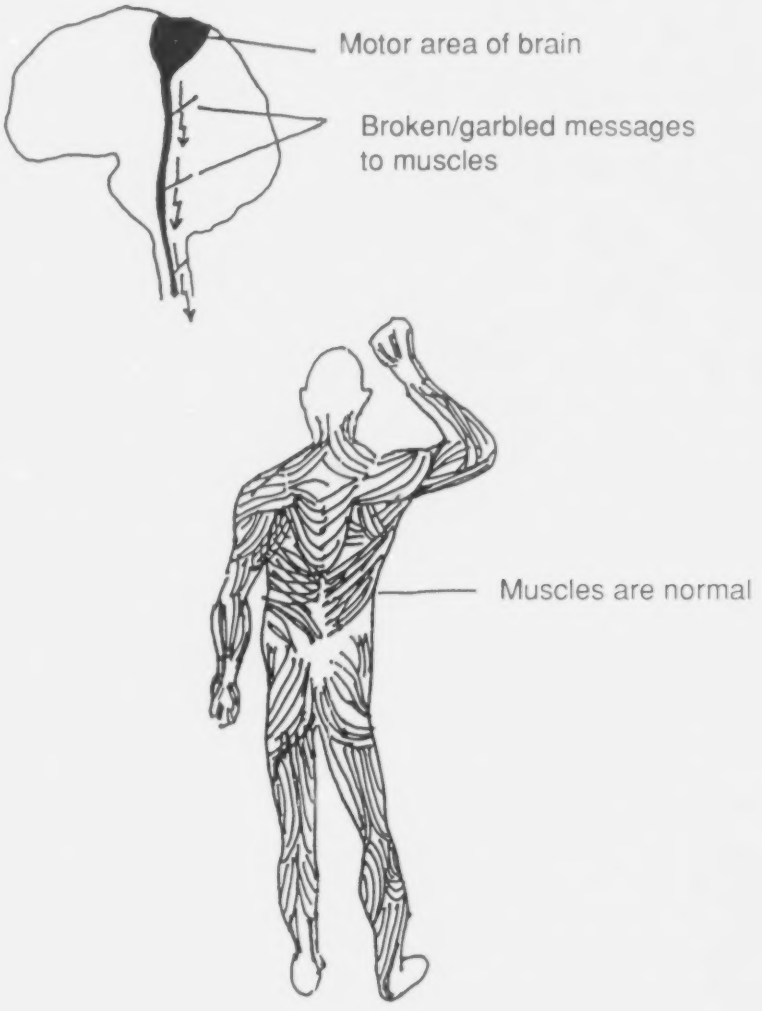
#62

ORTHOPEDIC
HANDICAPS

#63

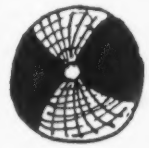
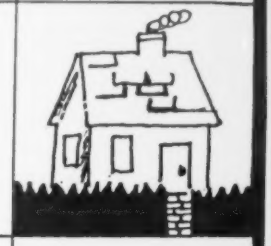
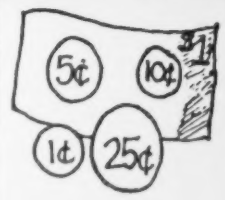
CEREBRAL PALSY

(centered in brain) (muscle weakness)



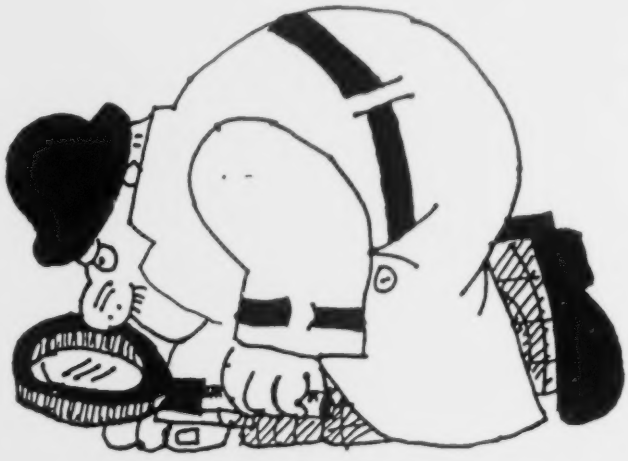
#64

Prostheses

Need	Want				
Have	Go				
Is	Are				
Ran	Eat				
Play	Take				
Ride	Move				
In	Out	I	DAD	FRIEND	TEACHER

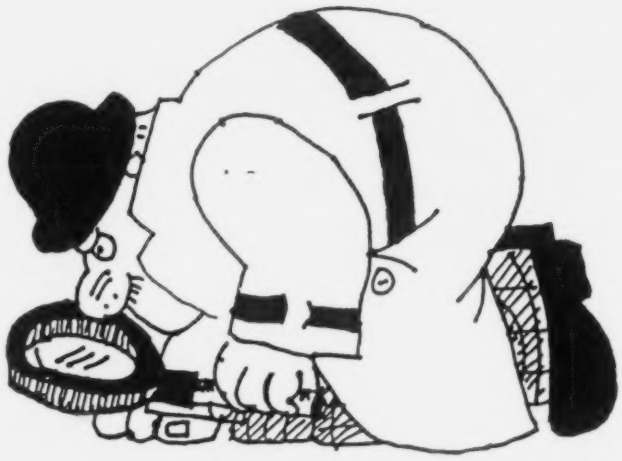
Messages

1. I need my umbrella.
2. Take the trash out.
3. Dad and I want grapes.
4. The squirrel ran to the tree.
5. My friend and I play ball.
6. I ride in the boat.
7. The teacher is at home.
8. The squirrel plays in the trashcan.
9. My friend and I eat ice cream.
10. Go in the room!



Encoding Messages
1) direct selection
2) scanning
3) encoding

#67

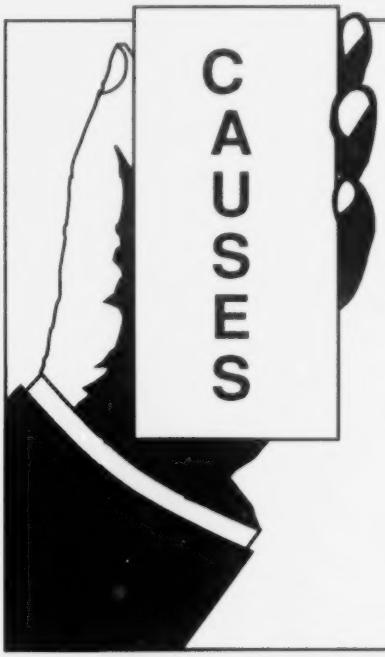


Encoding Messages
1) direct selection
2) scanning
3) encoding

MENTAL RETARDATION

Classifications:

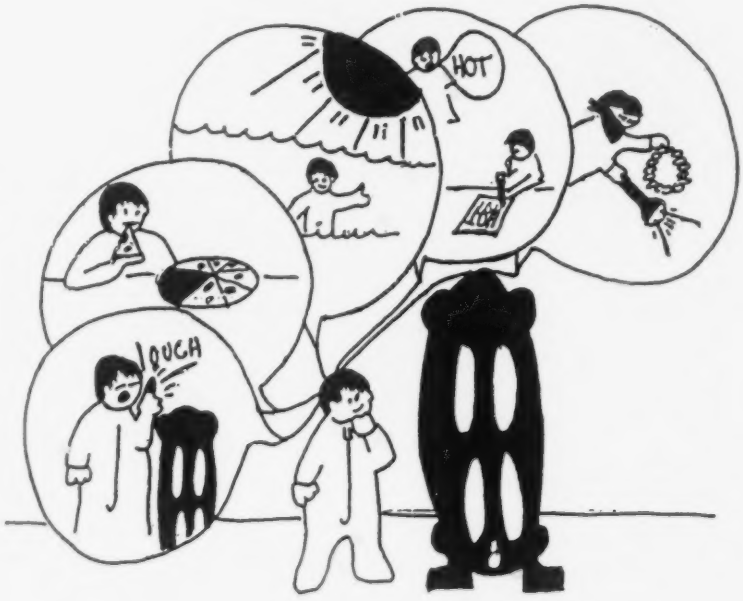
1. **Mildly Retarded:** with extra help and special classes, most of them can complete high school and become employed (85%).
2. **Moderately Retarded:** usually completes the lower school grades and special training that enables them to handle skills needed in everyday living. Usually can hold a job in a sheltered workshop setting.
3. **Severely Retarded:** usually requires special care and training. New teaching methods and discoveries are making it possible for them to learn more than it had been thought they could.



BEFORE BIRTH:
- Genetic mistake
- Something could happen to baby inside the mother

DURING BIRTH:
- Lack of oxygen
- Drugs

AFTER BIRTH:
- Accident
- Disease



From Kamien, 1979.

#71

A.

1. Reading
2. Alphabetizing

B.

1. Memory: Remember telephone number
   Letter/number recognition
2. Dexterity

C.

1. Recognize busy signal
2. Know to hang up

D.

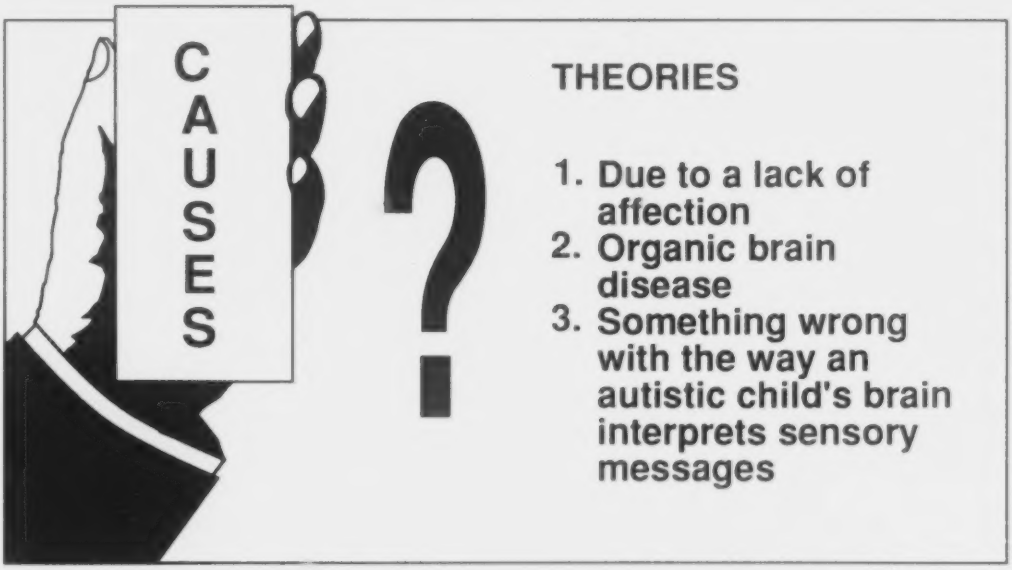
1. Recognize ring
2. Know to hang up after "enough" rings

E.

1. Understand language
2. Recognize when to stop

From Kamien, 1979.

1. Unable to relate to themselves or to others.
2. Half of all autistic children are mute–they do not speak. Those who do have speech, do not use it to communicate.
3. Bizarre behavior
   - •self-stimulatory
   - •self-destructive


CAUSES
?
THEORIES
1. Due to a lack of affection
2. Organic brain disease
3. Something wrong with the way an autistic child's brain interprets sensory messages

PACP Instructional Unit: Skills Checklist

After completing the activities in the PACP Instructional Unit, the nonhandicapped peers should be prepared to actively participate in the program. The checklist below outlines the skills necessary to the implementation of the program as described in the chapter. Following the completion of the unit, you may want to use the checklist as you test each student to make sure the skills have been mastered.

Student:_____ Date:_____

Before the Exercise Session:

___ The student can locate and set up the equipment needed for the exercise session.

___ The student can set up the group/individual reinforcement systems used during the exercise session.

During the Exercise Session:

___ The student can monitor heart rate using:
- ___ the manual method
  - a. locates radial pulsepoint
  - b. counts pulse for 6 seconds and multiplies by 10
- ___ the heart rate monitor
  - a. turns monitor on and off at appropriate times
  - b. reads digital display of heart rate
  - c. understands when partner should exercise more or less vigorously

___ The student can reinforce his/her partner
- a. verbally (says "good job," "way to go")
- b. physically (pats partner on back, claps, hugs)
- c. tangibly (uses predetermined reinforcers appropriately)

After the Session:

___ The student can put equipment away.

___ The student can apply reinforcement systems appropriately.

APPENDIX B

Materials for Protocol

The relationship between the students with handicaps and their nonhandicapped peers is an important variable to the success of the program. Student dyads should be assigned carefully. Ask students with whom they might like to exercise and then try the pairing. If it works (students enjoy each other and exercise at the appropriate intensity), great! If it doesn't work, **try another partner**. Once you have found pairs that work well together try to maintain the partnership. You may find, however, that sometimes changing partners has beneficial effects (We found this especially true for students who had partners with motivational and/or behavioral problems).

You may want to use the sheet that follows to make student assignments. It can be posted prior to each exercise session in the classroom of the nonhandicapped peers or at the exercise setting itself. The teacher in charge of the exercise session completes the sheet by listing the nonhandicapped peer, his or her partner with handicaps, and any notable comments. The comments may praise the nonhandicapped peer for a job well done, or report concern about low heart rate measures, or explain a new idea to help motivate their partner.

Assignment Sheet

Exercise will be: _____

Name	Partner with handicaps	Comments

Activities Packet

Creating interesting and varying routines during the exercise sessions is one way to help ensure interest and cooperation in the program. The following pages include activities you can use during the warm-up, aerobic, and cool-down components of the exercise sessions.

The activities have been divided into several groups: skills (gross motor and ball), animal walks, parachute play, aerobic games, and reinforcing games. Cut along the lines and file the cards into your own activity file. Then, as you come up with other ideas, add them as note cards to the file.

- balance
- creeping/walking
- walking/running
- jumping
- stair climbing
- ladder climbing

BALANCE (static)

On hands and knees have student:

- raise one hand (the other hand)
- raise one leg (the other leg)
- raise one leg and one hand on opposite sides of the body

BALANCE (static)

From a sitting position have student:

- balance on seat with feet on the floor
- balance on seat with one foot high and one foot low
- balance on stomach with hands and feet off the floor
- balance on hands and feet

BALANCE (static)

On foot, have student:

- balance on one foot
  —hands held by partner
  —unsupported
- balance on one foot with arms folded
- stand on tiptoes
  —hands held by partner
  —unsupported

BALANCE (static)

Using equipment such as a small box, low beam ladder, blocks, margarine containers, coffee tins. . . have student:

- stand sideways on low beam
- stand with one foot on each block, margarine container, coffee tin, book, or other small item
- using ladder, stand with one foot on each of the ladder rails and balance

BALANCE (dynamic) (continued)

- walk forward with one foot on each side of ladder
- walk, stepping in spaces between ladder rungs
- walk a pathway made of blocks
- walk across a balance beam

BALANCE (dynamic)

Using equipment such as chairs, trampoline, ladder, lines, and wide sewing elastic, have student:

- walk down a line, putting one foot in front of the other (allow student to push a cart if desired)
- follow his/her partner around a path outlined by pieces of elastic tied on several chairs
- walk along the bed of a trampoline or around inner tubes

CREEPING/CRAWLING

Have the student crawl/creep:

- through a crawling tunnel
- through a tunnel of chairs
- through a tunnel of mats
- under a rope
- up an incline
- around a pattern made of ropes

WALKING/JOGGING

Using equipment such as a small box, low beam ladder, blocks, margarine containers, coffee tins. . . have student:

- stand sideways on low beam
- stand with one foot on each block, margarine container, coffee tin, book, or other small item
- using ladder, stand with one foot on each of the ladder rails and balance

WALKING/JOGGING (continued)

- on the spot, bringing right knee up to touch right hand or elbow (alternate side also)
- over ropes placed at varying intervals on the floor

JUMPING

- place a hoop on the floor and have the student jump in and out of the hoop
- make tape lines on the floor, have the student jump over the lines
- make a path (i.e., using rubber tiles, tape squares) and have the student jump from one square to the next
- have student jump on mini-trampoline

STAIR CLIMBING

- have student step up on a low box using one foot and step off using the alternate foot
- place alternating footprints on the stairs; have student follow footprints up and down the steps
- have the student climb the stairs as quickly as possible since stair climbing can be an excellent aerobic exercise too

LADDER CLIMBING

- place a small ladder on the floor, have the student move down it frontwards using hands and feet and return backwards
- place the ladder on two tires and have the student move down and back using the hands and feet
- place the ladder on a low box, stair, or low object and have the student climb as high as possible

BALL SKILLS (rolling)

Have the student:

- roll the ball to his/her partner
- roll the ball to knock down objects, as in bowling
- roll the ball between two ropes to hit objects at the end

BALL SKILLS (throwing)

Have the student:

- throw two-hand underhand and two-hand overhand throws to his/her partner
- throw a yarn ball or tennis ball using one hand to his/her partner
- throw a ball or beanbag to a designated target (i.e. hoop, can, a shape or letter taped to floor)

BALL SKILLS (catching)

Have the student:

- sit on the floor ready to reach out and get a ball rolled by his/her partner
- grasp balls suspended by strings
- throw the ball to the wall and catch it
- throw a balloon into the air and catch it

SKILLS:
BALL

- rolling
- throwing
- catching

ANIMAL WALKS

Have the student try these various walks:

- *Elephant*—stand on feet, bend at waist with hands together hanging down, move slowly around room, letting arms sway like trunk of an elephant
- *Lion*—on hands and feet, walk around room with head held high

ANIMAL WALKS (continued)

- *Seal*—in semi-push-up position, weight supported on hands, legs straight and dragging behind (toes pointed), move forward alternating hands and dragging legs
- *Alligator*—move in a prone position, with body completely in contact with floor, pull body along with arms, leaving the tail (legs) to drag along behind
- *Dog*—move on all fours

ANIMAL WALKS

PARACHUTE PLAY

Stretch parachute on the ground in its circular pattern, student pairs should place themselves uniformly around the parachute.

Activities:

- *Up*—all children hold the edges of the parachute with both hands, put the parachute down on the floor, and on the signal "up," raise the parachute in the air while holding onto the edges

PARACHUTE PLAY (continued)

- *Make waves*—bring parachute to mid-height and vigorously shake it
- *Name*—raise the parachute up in the air; call the student's name who is to cross to the other side of the parachute
- *Number*—give each student a number; ask the student to cross to the other side when his/her number is called

PARACHUTE PLAY

PARACHUTE PLAY (continued)

- *Change places*—when the parachute is raised, call two names (or numbers); ask the students to change places
- *Popcorn*—raise the parachute to mid-height; put light plastic or yarn balls onto the parachute and shake it
- *Snakes*—as above, put ropes on the parachute, shake it

PARACHUTE PLAY (continued)

- *Ball game*—raise the parachute to mid-height, put one large, light ball on it; divide students into two teams, each team should try to prevent the ball from being put off on "their" side
- *Stories*—"going camping"-walk around with the parachute grasped in one hand; a storm comes (shake parachute) - run for cover (get inside the parachute)

AEROBIC GAMES (tag)

- *Object tag*—players run freely or along the designated course. "It" holds an object in his/her hand. When he/she tags someone else, the object is passed on to the new "it."
  •Note: if you play *object tag* along the designated walk/jog course as they perform their aerobic workouts, make sure that "it" only tags walkers/runners in *front* of him/her.

AEROBIC GAMES (tag)

- *Catch One, Catch All*— "It" tries to tag a player. As a person is tagged, he/she helps "it" catch the remaining players until all are caught. The game starts again with "it" being the last person tagged.
  •Note: You may play this along the designated walk/jog course as they perform their aerobic workout. Make sure that "it(s)" only tag walkers/runners in *front* of him/her.

- tag
- follow the leader

AEROBIC GAMES

- skill games
- team games
- relays
- sports
- partner games

AEROBIC GAMES (follow the leader)

- *Follow the leader*—Have the students follow a teacher or a nonhandicapped peer around the designated walk/jog course. The students follow the leader and repeat any action he/she does.
- Keep in mind, the actions of the leader must be aerobic! (See the list that follows for suggestions)

AEROBIC GAMES (follow the leader) (continued)

Suggestions: the leader

- walks, runs, hops, jumps...
- climbs stairs
- picks up a ball and throws it through a hoop, dribbles it, throws it against a wall and catches it
- climbs through hoops, under chairs, around cones

REINFORCING GAMES (skills)

- *Red light*—The leader stands in front of the players. Students stand at the opposite end. As the leader hides his/her face and counts to three, the students advance (walking, crawling, hopping, scooterboarding) towards the leader. On the count of three, the leader turns quickly to see if any students are moving. If so, that student(s) must return to the starting point. The student who reaches the leader first becomes the next leader.

REINFORCING GAMES (skills)

- *Ball in the sky*—Divide students into two equal teams, each forming a separate circle. Using lightweight balls (balloons, beachballs & nerfballs) have the players from each team try to keep the ball up in the air by hitting it with two hands. The team keeping it in the air the longest wins the point. Play to a designated number of points.

REINFORCING GAMES (skills)

- *Keep away*—Divide the participants into two equal teams. One side is given a ball. This side attempts to keep the ball by passing it to individuals on their team. The other team attempts to intercept the ball. When the ball is intercepted, that side passes to its players and the other side is on the defensive. The ball may not be bounced and no player may run with the ball. If a player breaks these rules, then the ball goes to the other team.

REINFORCING GAMES (skills)

- *Over & Under*— Players are divided into equal teams. Players stand in line, one behind the other. At the signal, the leader passes the ball (over his/her head or between his/her legs) to the person behind him/her. That person passes the ball, in the same way, to the person behind him, and so on to the last person who runs to the head of the line and starts the ball going again. Play continues until the captain returns to the head of the line.

REINFORCING GAMES (relays)

- *Shoe box relay*— Students are divided into equal teams. Players place their feet in two paper cartons and advance by sliding them along in a walking motion. Only two cartons are allowed per team, so that each player must change when he returns to the starting line.
- *Spoon relay*—Students are divided into equal teams. Players carry a spoon with a penny in it to turning point and back.

REINFORCING GAMES (relays)

- *Kangaroo relay*—Students are divided into equal teams. Players hold a ball between their knees. Without touching the ball with their hands, they hop or walk to the turning point and back.
- *Scuttle relay*—Students are divided into equal teams. Players advance by clasping their hands together behind their knees and "scuttling."
- *Stunt relay*—Students are divided into equal teams. Players run to the turning point, perform a stunt (jumping, hopping, toe touches, bouncing a ball...) and then run back to starting line.

REINFORCING GAMES (relays)

- *Basketball relay*—Students are divided into equal teams. Players dribble, dribble and shoot, or pass the ball to a partner as they move to the turning point and back.
- *Round the bases relay*—Students are divided into equal teams. On signal, the first player of each team takes off around the bases (one in one direction, 1st, 2nd, 3rd) the other in the reverse direction (3rd, 2nd, 1st). When the first player touches homeplate, the second player goes.

REINFORCING GAMES (Sports)

- Have the students play any of the following games. Note: rules may need to be modified for your students.
  - T-ball
  - kickball
  - basketball
  - nerf football
  - volleyball (try using balloons)
  - soccer
  - swimming

REINFORCING GAMES (partner)

Have partners (nonhandicapped peers & students with handicaps)

- Sit facing each other with knees bent, feet touching and grasping hands. The nonhandicapped peer leans forward, allowing their partner to lean back, then the nonhandicapped peer leans backwards, allowing their partner to lean forward.
- Stand back to back and lock elbows. Then walk around the room in unison.

REINFORCING GAMES (partner)

- Sit down, bounce/throw/roll ball to partner
- Standing, bounce/throw/roll ball to partner
- One person throws ball against wall; other catches it
- One person stands with legs apart; the other rolls ball through his/her legs
- Hold the ball stomach to stomach/back to back/ head to head and walk it around the gym

Cassette Tape

A cassette tape may be made to facilitate the group interval and station activities mentioned in Table 6. When making the tape, select favorite songs that are fast enough to be appropriate for the activity. You may even want to ask your students for suggestions. If you do, be prepared for a real earful of sounds!

The following is a schedule that works well for a session of approximately 26 minutes:

MUSIC/SILENCE	PURPOSE	TIME
* 5 minutes of music	warm-up session	5 min
1 minute silence	station #1	6 min
2 minutes music	walk/jog	8 min
1 minute silence	station #2	9 min
2 minutes music	walk/jog	11 min
1 minute silence	station #3	12 min
2 minutes music	walk/jog	14 min
1 minute silence	station #4	15 min
2 minutes music	walk/jog	17 min
1 minute silence	station #5	18 min
2 minutes music	walk/jog	20 min
1 minute silence	station #6	21 min
* 5 minutes music	cool down	26 min

*The tape should be made allowing for the longest time possible available for activity. If there is a time constraint, the exercise may be stopped at any point and the cool down run without music.

APPENDIX C

Fitness Evaluation: Laboratory fitness evaluation and prescription

There are several ways to evaluate aerobic fitness. Laboratory tests most accurately measure these changes. If you have access to a laboratory where they do fitness evaluations (in a hospital or university) the information below may be useful to you.

In our exercise evaluation the following measures were collected:

1) *Body Structure and Composition Assessment*: Height, body weight, and subcutaneous fat were measured. Measurements of percent body fat were determined using skinfold calipers. For each assessment occasion, skinfold measurements were taken three times at two sites, the triceps (back of upper arm) and subscapular (mid back) with a large caliper. The averaged value of the three measurements was used to determine percent body fat as defined by Slaughter et al. (1988).

2) *Graded Exercise Test*: A submaximal graded exercise test on a motorized treadmill was used to determine changes in aerobic fitness. The treadmill protocols were individualized to accommodate the large variation in motor abilities of the participants. Prior to the initiation of the first test, the treadmill speed was adjusted to a comfortable walking pace (1.75-3.50 mph) for each student. The speed was then held constant. Workload was incremented in two-minute intervals starting at zero percent grade and increasing two percent at each interval. Heart rate was monitored throughout and recorded at the end of each test minute. The test was terminated when 60 to 80 percent of the students' estimated maximum heart rate was achieved or when the student voluntarily terminated the test.

The information collected during the evaluation was incorporated into an exercise prescription following the guidelines established by the American College of Sports Medicine. A copy of the exercise prescription is presented on the following pages.

PACP FITNESS EVALUATION
Exercise Prescription
Summary Sheet

Name_____ Date_____

Descriptive Measures	Test 1	Test 2	Test 3
Age (yrs)	_____	_____	_____
Weight	___lbs ___kg	___lbs ___kg	___lbs ___kg
Standing Height	___in ___cm	___in ___cm	___in ___cm
Body Composition Measures			
Triceps (mm)	_____	_____	_____
Subscapula (mm)	_____	_____	_____
Percent Body Fat	_____	_____	_____
Fat Weight	___lbs ___kg	___lbs ___kg	___lbs ___kg
Fat-Free Weight	___lbs ___kg	___lbs ___kg	___lbs ___kg
Ideal Body Weight (%)	___lbs ___kg	___lbs ___kg	___lbs ___kg
(%)	___lbs ___kg	___lbs ___kg	___lbs ___kg
Weight Loss (%)	___lbs ___kg	___lbs ___kg	___lbs ___kg
(recommended) (%)	___lbs ___kg	___lbs ___kg	___lbs ___kg
Cardiovascular Measures			
Resting Heart Rate (bpm)	_____	_____	_____
Maximum Heart Rate (bpm)		_____	_____
(estimated)			
Target Heart Rate (bpm)	___ - ___	___ - ___	___ - ___
(70-85%) (bp 10sec)	___ - ___	___ - ___	___ - ___
Exercise Duration (min)	___ ___ 9	___ ___ 9	___ ___ 9
g=grade s=speed (maximum)	___ s	___ s	___ s
Predicted VO_2 max (ml/kg min)	_____	_____	_____

Body Size and Composition Measurement

Body Size

The size of an individual is best described by body weight and height. These measures are good indicators of growth in children and for this reason, extensive standardized tables for height and weight have been developed as guidelines for growth patterns.

Body Composition

Body composition is also an important aspect of health and fitness. Theoretically, one's body weight can be divided into two components: 1) fat weight and 2) fat-free weight, which contains muscle, bone, water, and vital organs. It is the amount of body fat that varies the most among individuals. For example, a gymnast who weighs 120 pounds would probably have less body fat than her non-exercising peer who also weighs 120 pounds. It is the amount of fat that is the real concern in weight analysis. While some body fat is essential for life, excess body fat is considered detrimental to health as it can lead to obesity, enhance the risk for coronary heart disease, and hinder the performance of physical activity.

Determination of body fat proportions can be made by certain direct and indirect measurements. Direct measurements are the most accurate, but the procedures are lengthy and complicated. We felt they were beyond the scope of this project. So, in order to estimate the body composition of your child we have used an indirect measurement technique where skinfold thickness is measured with a caliper at two sites: the tricep (back of the upper arm) and the subscapula (just below the lower part of the shoulder blade). The total measurement at these two sites has been found to correlate highly with body fat percentages determined by direct measurement.

Based upon various standards and health risk statistics, the following percentages are considered the average values for boys and girls:

boys: 10 to 20
girls: 12 to 22

Cardiovascular Measures: Aerobic Fitness

Why a Graded Exercise Test?

Endurance activities that require stamina or "good wind" are called *aerobic* exercises. Aerobic means "in the presence of oxygen" and aerobic fitness is the body's ability to take in (requires efficient respiration), transport (requires an efficient and healthy heart and network of blood vessels), and utilize (depends on the quality of blood and other specific cellular components) oxygen. The maximum amount of oxygen that can be transported from the lungs to the working cells is called the *maximal oxygen uptake (V̇O2 max)*. $\dot{V}O_2$max is considered the best single measure of overall fitness because it reflects the condition of the cardiovascular and respiratory systems.

A simple conceptualization of working capacity will help to explain why $\dot{V}O_2$max is considered the standard measure of cardiovascular fitness. Every activity requires energy. The body uses food and oxygen to produce the energy it needs to perform its normal functions. The body stores food, but it cannot store oxygen; therefore it is the amount of oxygen supplied to the working tissues that determines the amount of work that can be performed. If the respiratory muscles are strong, more oxygen can be brought in; if the muscles of the heart are efficient and the blood vessels pliable, more oxygen-carrying blood can be transported to the working tissues; and finally, if the muscles are toned, the cells can absorb and utilize blood and oxygen more efficiently.

$\dot{V}O_2$max is most accurately measured by a maximal graded exercise test in which a person performs on a treadmill or cycle ergometer while heart rate and blood pressure are closely monitored. The expiratory air is collected during the performance and is analyzed for the amount of oxygen it contains. If there is a lot of oxygen in the expired air, the body is not as efficient as it could be in using the oxygen: the person may not be in very good shape. On the other hand, if there is not very much oxygen in the expired air, the body was efficient in using the oxygen: the person is probably in good shape. It is often not practical to measure $\dot{V}O_2$max directly. It demands relatively complicated laboratory equipment and maximal exertion of the person making the test. However, submaximal tests are an alternative. The submaximal exercise test is based on the principlethat the pulse rate increases linearly with increasing workloads. Consequently, the results from the submaximal performance can be projected to estimate the maximal oxygen consumption and heart rate.

Heart Rate Responses

At rest, a normal heart beats anywhere from 60-100 beats per minute. As one begins to exercise, the muscles need more and more oxygen so the heart must beat faster and faster to meet their demands. The heart rate will continue to rise until it just can't beat any faster. The point at which it is beating as fast as it possibly can is called the *maximal heart rate.* Scientists have found that maximum heart rate values are related to age. As one gets older, the maximum heart rate declines. This decline is fairly consistent, and thus a fairly accurate estimation of it can be determined.

What we want to see is a gradual increase in heart rate as the workload (percent grade on the treadmill) increases. Over time, as your child becomes more fit, we also hope to see that his or her cardiorespiratory system has become more efficient resulting in a lower heart rate response to the same workload.

Summary

Based on the results of the graded exercise test the following information provides a medically safe exercise prescription for your child:

Intensity—How Much Exercise?

The right amount of exercise is the amount that sufficiently stresses the cardiovascular system to utilize adaptive mechanisms that, with time, result in desired training effects. Research has identified between 70 and 85 percent of an individual's maximal heart rate to be a safe and efficient cardiovascular stress. Based on the results of your child's test, the appropriate exercise intensity (target heart rate) has been recorded on the summary sheet.

Duration—How Long?

In order to obtain the desired training effects and not interfere too much with your child's classroom schedule, the exercise session will be 20-30 minutes. The exercise sessions will be composed of three parts: 1) warm up, 2) aerobic exercise (walk or jog), and 3) cool down.

Frequency—How Often?

In order to develop a training effect, the appropriate intensity and duration of exercise must be performed at a minimum of 3 times per week. Using this minimum, your child will be exercising at least 3 times per week.

SUMMARY

Intensity	70-85% HR max 70% ____ bpm ____bp10sec 85% ____ bpm ____bp10sec
Duration	20-30 minutes per session
Frequency	3 times per week

Fitness Evaluation: Field Test

The three tests described below are included for use in evaluating your students' aerobic fitness level. In order to obtain valid and reliable results, students must be adequately prepared for the test. Students should be allowed to practice distance running with emphasis placed on the concept of pace. Most uninstructed children will run too fast early in the test and then be forced to walk during the latter stages. Results are usually better if the child can maintain a constant pace during most of the run, walking for short periods of time only if necessary, and perhaps using a strong closing effort. Students should be properly motivated. This test, like many other physical education tests, is only as good as the effort provided by the participant. Please refer to the evaluation section for limitations of the field test before undertaking this test with your student.

The AAHPERD Health Related Physical Fitness Test Items

Distance Runs

Purpose

The purpose of the distance runs is to measure maximal functional capacity and endurance of the cardiorespiratory system.

Equipment and Facilities

Either of the two distance run tests can be administered on a 440-yard or 400 meter track or on any other flat, measured area. Examples of appropriately measured areas are the 110 yard or 100 meter straightaway, other outside fields, or an indoor court area.

Test Description

Standardized procedures and norms are provided for two optional distance run tests: the one mile run for time and the nine-minute run for distance. The decision as to which of the two tests to administer should be based on facilities, equipment, time limitations, administrative considerations, and personal preference of the teacher.

One-Mile Run

Students are instructed to run one mile in the fastest possible time. The students begin on the signal, "ready, start." As they cross the finish line, elapsed time should be called to the participants (or to their partners). Walking is permitted, but the objective is to cover the distance in the shortest possible time.

Nine-Minute Run

Students are instructed to run as far as possible in nine minutes. The students begin on the signal, "ready, start." Participants continue to run until a whistle is blown at nine minutes. Walking is permitted, but the objective is to cover as much distance as possible during the nine minutes.

Optional Distance Runs for Older Students

For students 13 years of age and older, the 1.5 mile run for time or the 12-minute run for distance may be utilized as the distance run item. Administrative procedures for these tests are the same as for the one mile and nine-minute runs. Appropriate norms for the distance run tests are provided in the tables on the following pages.

Table 2-1. Percentile Norms. Ages 5-18 for the One Mile Run (minutes and seconds) for Boys.

Age	5	6	7	8	9	10	11	12	13	14	15	16	17+
Percentile													
99	7:45	8:15	7:17	6:14	6:43	6:25	6:04	5:40	5:44	5:36	5:44	5:40	5:41
95	9:02	9:06	8:06	7:58	7:17	6:56	6:50	6:27	6:11	5:51	6:01	5:48	6:01
90	9:41	9:30	8:35	8:12	7:29	7:26	7:19	6:44	6:22	6:05	6:08	6:02	6:13
85	10:40	10:00	8:59	8:22	8:00	7:40	7:30	6:57	6:33	6:13	6:18	6:12	6:28
80	11:13	10:23	9:18	8:45	8:22	7:57	7:48	7:12	6:42	6:21	6:29	6:22	6:30
75	11:32	10:55	9:37	9:14	8:36	8:10	8:00	7:24	6:52	6:36	6:35	6:28	6:36
70	11:50	11:20	9:45	9:31	8:50	8:23	8:08	7:37	7:00	6:41	6:42	6:41	6:42
65	12:34	11:33	10:04	9:43	9:02	8:34	8:21	7:48	7:06	6:48	6:56	6:47	6:57
60	12:48	11:47	10:46	10:20	9:14	8:49	8:39	7:59	7:14	6:54	7:02	6:53	7:07
55	13:17	12:03	11:10	10:41	9:30	9:03	8:56	8:08	7:20	7:01	7:07	7:03	7:15
50	13:46	12:29	11:25	11:00	9:56	9:19	9:06	8:20	7:27	7:10	7:14	7:11	7:25
45	14:09	12:50	11:44	11:24	10:24	9:34	9:25	8:34	7:40	7:15	7:23	7:19	7:30
40	14:17	13:20	12:04	11:49	11:01	9:45	9:46	8:51	7:51	7:24	7:30	7:27	7:45
35	14:52	13:55	12:44	12:12	11:25	10:10	10:10	9:10	8:02	7:34	7:41	7:40	7:58
30	15:18	14:13	13:30	12:30	11:44	10:38	10:40	9:30	8:24	7:54	7:52	7:51	8:06
25	16:05	15:10	14:02	13:29	12:00	11:05	11:31	10:00	8:35	8:02	8:04	8:07	8:26
20	16:37	15:18	14:37	13:56	12:25	11:31	12:02	10:42	8:50	8:15	8:26	8:41	8:39
15	17:08	15:51	15:06	14:25	13:21	12:11	12:40	11:20	9:09	8:43	8:48	9:10	9:05
10	17:21	16:56	15:50	15:16	14:19	13:00	13:37	12:07	9:39	9:30	9:25	9:52	10:37
5	18:25	17:38	17:17	16:19	15:44	14:28	15:25	13:41	10:23	10:32	10:37	10:40	10:56

Table 2-2. Percentile Norms. Ages 5-18 for the One Mile Run (minutes and seconds) for Girls

Age	5	6	7	8	9	10	11	12	13	14	15	16	17+
Percentile													
99	9:03	8:06	7:58	7:45	7:21	7:09	7:07	6:57	6:20	6:44	6:36	6:33	6:54
95	9:45	9:18	8:48	8:45	8:24	7:59	7:46	7:26	7:10	7:18	7:39	7:07	7:26
90	11:23	9:52	9:35	9:30	8:44	8:30	8:10	7:44	7:45	7:39	8:01	7:47	8:05
85	12:08	10:40	9:55	9:45	9:08	8:50	8:36	8:05	8:01	7:54	8:10	8:13	8:28
80	12:48	11:06	10:27	10:17	9:31	9:10	8:57	8:18	8:12	8:03	8:24	8:33	8:44
75	13:09	11:24	10:55	10:35	9:58	9:30	9:12	8:36	8:18	8:13	8:42	9:00	9:03
70	13:26	11:46	10:65	10:50	10:07	9:47	9:29	8:55	8:27	8:23	8:59	9:26	9:10
65	13:52	12:26	11:24	11:05	10:17	10:02	9:44	9:08	8:41	8:37	9:10	9:52	9:41
60	14:14	12:46	11:43	11:30	10:32	10:23	10:00	9:21	8:56	8:55	9:38	10:06	9:28
55	14:42	13:10	12:03	11:43	10:56	10:49	10:16	9:33	9:14	9:04	9:47	10:21	9:34
50	15:08	13:48	12:30	12:00	11:12	11:06	10:27	9:47	9:27	9:35	10:05	10:45	9:47
45	15:39	14:08	12:55	12:15	11:29	11:24	10:56	10:05	9:37	10:00	10:35	11:72	9:59
40	16:20	14:19	13:42	12:45	12:00	11:41	11:12	10:22	9:57	10:20	10:51	11:35	10:04
35	17:07	14:51	14:05	13:15	12:20	11:51	11:29	10:39	10:12	10:40	11:43	12:00	10:14
30	17:32	15:06	14:08	13:47	12:42	12:09	11:51	11:00	10:31	11:11	12:05	12:32	10:50
25	17:59	15:27	14:30	14:16	13:18	12:54	12:10	11:35	10:56	11:43	12:21	13:00	11:28
20	18:19	15:55	15:10	14:56	13:52	13:31	12:36	11:57	11:23	12:21	13:04	14:05	12:12
15	18:28	16:58	15:27	15:24	14:22	14:00	13:16	12:35	12:20	13:56	14:07	14:49	12:50
10	18:38	18:11	16:03	16:30	15:25	15:12	14:41	13:34	13:09	15:20	15:25	15:02	13:05
5	19:00	18:50	17:44	16:58	16:42	17:00	16:56	14:46	14:55	16:59	16:22	15:30	15:24

Table 2-3. Percentile Norms. Ages 5-18 for the 9-Minute Run (yards) for Boys

Age	5	6	7	8	9	10	11	12	13	14	15	16	17+
Percentile													
99	1975	2000	2400	2520	2450	2520	2520	2880	2615	2686	2757	2828	2899
95	1760	1750	2020	2200	2175	2250	2250	2400	2402	2473	2544	2615	2615
90	1530	1650	1900	2100	2040	2120	2109	2175	2320	2391	2462	2533	2604
85	1425	1584	1790	1940	1940	2013	2025	2042	2213	2284	2384	2455	2526
80	1370	1525	1733	1870	1875	1950	1970	2000	2150	2221	2292	2363	2434
75	1320	1469	1683	1810	1835	1910	1925	1975	2096	2167	2238	2309	2380
70	1310	1440	1640	1770	1800	1859	1890	1900	2049	2120	2191	2262	2333
65	1275	1400	1590	1725	1760	1810	1860	1860	2008	2079	2150	2221	2292
60	1220	1350	1540	1695	1740	1780	1808	1810	1964	2035	2106	2177	2248
55	1200	1320	1490	1650	1695	1725	1770	1790	1926	1997	2068	2139	2210
50	1170	1280	1440	1595	1660	1690	1725	1760	1885	1956	2027	2098	2169
45	1120	1232	1400	1540	1625	1633	1690	1740	1844	1915	1986	2057	2128
40	1100	1200	1370	1500	1600	1600	1640	1680	1806	1877	1948	2019	2090
35	1075	1170	1340	1470	1537	1584	1600	1620	1762	1833	1904	1975	2046
30	1010	1130	1310	1420	1490	1536	1575	1590	1721	1792	1863	1934	2005
25	990	1090	1243	1380	1440	1487	1540	1500	1674	1745	1816	1887	1958
20	940	1050	1195	1340	1370	1420	1440	1450	1620	1691	1762	1833	1904
15	880	990	1140	1263	1310	1356	1390	1356	1557	1628	1699	1770	1841
10	830	940	1070	1180	1243	1250	1275	1300	1450	1521	1592	1663	1734
5	600	816	990	1053	1104	1110	1170	1000	1368	1439	1510	1581	1652

Table 2-4. Percentile Norms. Ages 5-18 for the 9-Minute Run (yards) for Girls

Age	5	6	7	8	9	10	11	12	13	14	15	16	17+
Percentile													
99	1584	1980	2340	2260	2300	2240	2170	2370	2197	2235	2273	2311	2349
95	1540	1700	1900	1860	2050	2067	2000	2175	2085	2123	2161	2199	2237
90	1410	1620	1710	1750	1870	1900	1930	2070	2005	2043	2081	2119	2157
85	1358	1584	1650	1695	1770	1780	1833	1940	1899	1937	1975	2013	2051
80	1320	1520	1570	1600	1700	1750	1780	1840	1837	1875	1913	1951	1989
75	1300	1440	1540	1540	1650	1650	1723	1760	1785	1823	1861	1899	1937
70	1243	1390	1490	1520	1590	1596	1650	1733	1738	1776	1814	1852	1890
65	1225	1310	1460	1475	1540	1567	1620	1700	1698	1736	1774	1812	1850
60	1220	1253	1402	1440	1515	1525	1570	1690	1655	1693	1731	1769	1807
55	1180	1230	1356	1403	1475	1490	1539	1650	1617	1655	1693	1731	1769
50	1140	1208	1344	1358	1425	1460	1480	1590	1577	1615	1653	1691	1729
45	1100	1180	1310	1330	1390	1425	1460	1542	1537	1575	1613	1651	1689
40	1060	1140	1280	1315	1350	1375	1405	1500	1499	1537	1575	1613	1651
35	1010	1100	1225	1280	1320	1345	1380	1475	1456	1494	1532	1570	1608
30	1000	1060	1190	1250	1290	1290	1356	1420	1416	1454	1492	1530	1568
25	950	1017	1150	1225	1243	1250	1345	1356	1369	1407	1445	1483	1521
20	866	990	1110	1180	1225	1230	1300	1220	1317	1355	1393	1431	1469
15	830	915	1050	1110	1130	1180	1200	1200	1255	1293	1331	1369	1407
10	750	850	997	1056	1080	1100	1125	1130	1149	1187	1225	1263	1301
5	700	750	860	970	960	940	904	1000	1069	1107	1145	1183	1221

**Table 2-5. Percentile Norms.
Ages 13-18 for the 1.5 Mile (yards)
and 12-Minute (minutes and seconds) Run for Boys**

Percentile	12-Min. Run	1.5 Mile Run
95	3297	8:37
90	3140	9:15
85	3037	9:40
80	2952	10:01
75	2879	10:19
70	2819	10:34
65	2759	10:48
60	2699	11:02
55	2648	11:15
50	2592	11:29
45	2536	11:42
40	2485	11:55
35	2425	12:10
30	2365	12:24
25	2305	12:39
20	2232	12:56
15	2147	13:17
10	2044	13:42
5	1888	14:20

**Table 2-6. Percentile Norms.
Ages 13-18 for the 1.5 Mile (yards)
and 12-Minute (minutes and seconds) Run for Girls**

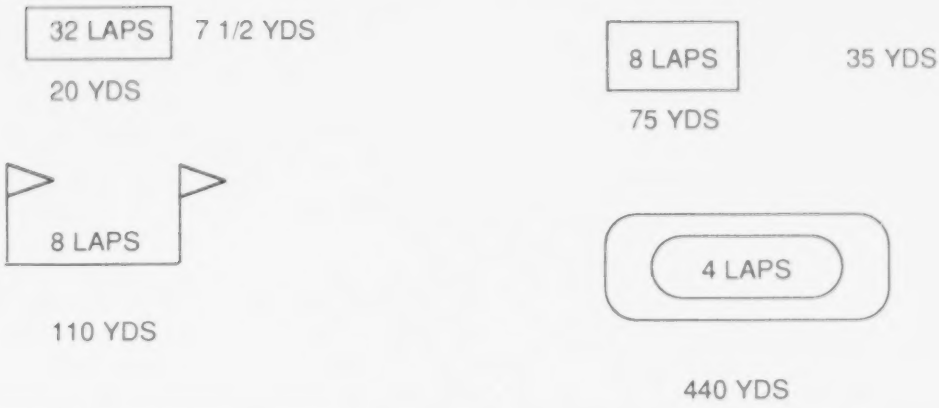
Percentile	12-Min. Run	1.5 Mile Run
95	2448	12:17
90	2318	13:19
85	2232	14:00
80	2161	14:34
75	2100	15:03
70	2050	15:26
65	2000	15:50
60	1950	16:14
55	1908	16:34
50	1861	16:57
45	1815	17:19
40	1772	17:39
35	1722	18:03
30	1672	18:27
25	1622	18:50
20	1561	19:19
15	1490	19:53
10	1404	20:34
5	1274	21:36

Fitness Evaluation: Field Test (con't)

Scoring

The one mile and 1.5 mile runs are scored to the nearest second. The 9-minute and 12-minute runs are scored to the nearest 10 yards or 10 meters. Performances should be recorded on a score card.

Areas Suitable for Distance Run Tests



Schematic drawing of areas that can be used for distance run tests.

Fitness Evaluation: Skill Checklist

0: skills nonexistent
-: improvement needed
+: competent in skill

STUDENT NAMES

WALKING						
JOGGING						
RUNNING						
SKIPPING						
GALLOPING						
KICKING						
THROWING—DISTANCE						
THROWING—TARGET						
CATCHING						
BOUNCING						
JUMPING ROPE						
CRAB WALK—BACKWARD						
CRAB WALK—FORWARD						
SIT-UPS						
MODIFIED SIT-UPS						
PUSH-UPS						
MODIFIED PUSH-UPS						

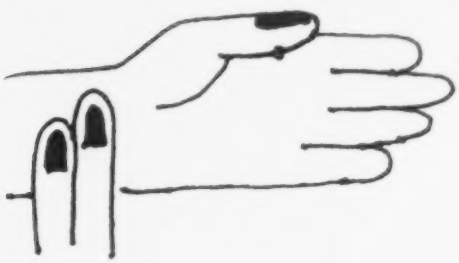
Fitness Evaluation: Locating a Pulse

A pulse is caused by the blood stopping and starting as it rushes through the arteries. When the heart contracts, it forces blood out into the arteries. As the heart relaxes, the artery walls contract to push the blood along. Each time the artery walls expand and contract is one pulse beat.

Arteries are usually located far below the skin for protection. However, they do come closer to the skin at several points on your body. Two of these points are diagrammed below.

Two cautionary notes: When taking a pulse: 1) *do not* use your thumb. It has its own pulse. 2) *do not* push too hard as you feel for a pulse. You may cut off the blood supply.

A) RADIAL PULSE



B) CAROTID PULSE

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Program Evaluation - Consumer Satisfaction Survey

By periodically asking the students with disabilities, their nondisabled peers, the parents, teachers, and staff to evaluate the goals and workings of the program, you will learn about the positive aspects of your program and about those aspects that may need to be modified. A sample survey is presented on the following pages.

SUMMATIVE CONSUMER SATISFACTION

1. How important do you feel it is for students with and without disabilities to interact socially?

+———+———+———+———+———+

not at all important — very important

Comments:

2. How strongly do you believe that school time should be allotted to programs that deal with facilitating social interaction between students with and without disabilities?

+———+———+———+———+———+

not strongly at all — very strongly

Comments:

3. How important do you feel it is for students with disabilities to have a chance to

   a. learn more about students without disabilities?

+———+———+———+———+———+

not at all important — very important

Comments:

   b. interact with students without disabilities?

+———+———+———+———+———+

not at all important — very important

Comments:

c. be friends with students without disabilities?

+———+———+———+———+———+
not at all very
important important

Comments:

4. How important do you feel it is for students without disabilities to have a chance to

a. learn more about students with disabilities?

+———+———+———+———+———+
not at all very
important important

Comments:

b. interact with students with disabilities?

+———+———+———+———+———+
not at all very
important important

Comments:

c. assume a helping role with students with disabilites?

+———+———+———+———+———+
not at all very
important important

Comments:

d. be friends with students with disabilities?

+———+———+———+———+———+
not at all very
important important

Comments:

5. How important do you feel it is for students in your school to be physically fit?

+———+———+———+———+———+
not at all important — very important

Comments:

6. How strongly do you believe that school time should be allotted to programs that deal with physical fitness?

+———+———+———+———+———+
not strongly at all — very strongly

Comments:

7. How important do you feel it is for students in your school to

a. participate in aerobic exercise (walk, jog, swim)?

+———+———+———+———+———+
not at all important — very important

b. learn more about sport skills (football, soccer, basketball)?

+———+———+———+———+———+
not at all important — very important

c. participate in strength-building exercises (push-ups, sit-ups, weight lifting)?

+———+———+———+———+———+
not at all important — very important

d. participate in flexibility exercises (stretching)?

+———+———+———+———+———+
not at all important — very important

8. How valuable do you think this program is to students with disabilities?

+———+———+———+———+———+

not at all valuable — very valuable

Comments:

9. How valuable do you think this program is to the students without disabilities?

+———+———+———+———+———+

not at all valuable — very valuable

Comments:

10. Please provide us with any suggestions you might have for improving the goals and purposes of the program.

11. How much do you think the handicapped students involved in this program enjoyed it?

+———+———+———+———+———+

none — a lot

Comments:

b. How much do you think the nonhandicapped students involved in this program enjoyed it?

+———+———+———+———+———+

none — a lot

Comments:

12. Since this program began in your school, have you noticed any changes in the students with disabilities in the following areas:

a. social interaction with students without disabilities

+———+———+———+———+———+
none at all a lot of change

Comments:

b. social skills in general

+———+———+———+———+———+
none at all a lot of change

Comments:

c. fitness/activity level

+———+———+———+———+———+
none at all a lot of change

Comments:

d. other: _____

+———+———+———+———+———+
none at all a lot of change

Comments:

13. Since this program began in your school, have you noticed any changes in the students without disabilities in the following areas:

a. social interaction with students who are disabled

+———+———+———+———+———+

none at all — a lot of change

Comments:

b. fitness/activity level

+———+———+———+———+———+

none at all — a lot of change

Comments:

c. other: _____

+———+———+———+———+———+

none at all — a lot of change

Comments:

14. Does the program affect the routine of the school?

+———+———+———+———+———+

very negatively — very positively

Comments:

15. How satisfied are you with the way the program staff

a. manages the program?

+———+———+———+———+———+
not at all satisfied — very satisfied

Comments:

b. communicates with you about the program?

+———+———+———+———+———+
not at all satisfied — very satisfied

Comments:

16. What comments, if any, have students, parents, and/or teachers made to you about the program?

17. Please provide us with any suggestions you might have for improving the implementation of this program.

APPENDIX D

Motivational Strategies: Reinforcement Selection

Identifying Reinforcers

The fundamental rule of reinforcement is *individualization*. That is, what is reinforcing to one person may not be reinforcing to another. A corollary to this rule is that what is reinforcing at one time may not be reinforcing at another time for the same person. If you've just completed a meal, chances are that additional food will not be as reinforcing as it was just prior to starting the meal. Even though reinforcers need to be assessed for each individual participant in your exercise program, it is possible, even likely, that some reinforcers will have general appeal to the entire group. The important point is to determine ahead of time what is and what is not reinforcing or motivating for the participants.

A few methods can be used to make this determination; each dependent upon the skills of the participants. Some suggestions are presented below.

1. What is reinforcing for one child may not be so for another. Therefore, selection of potential reinforcers is critical to the success or failure of the program.

Techniques for selecting effective reinforcers fall into five basic categories: ask, observe, sample, forced choice, and try and see.

Ask

A. Provide the child with a list and ask him or her to tell you the one preferred.
B. Pointing to the actual foods, toys or pictures of activities that they would like is an alternative for children who cannot tell you their preference.
C. If the child can write, she or he can make a list.

Observe

Record what the child does during his or her free time, considering all the available activities. This will indicate potential preferred activities.

Reinforcer Sampling

Give the child an opportunity to try some foods, activities, toys, etc. that she or he has not had an opportunity to try previously. You may discover new reinforcers for a child.

Forced Choice

A. Provide the child with a choice of potential reinforcers (e.g., three to five items) and ask him or her to select the one preferred. Narrow the choices until the child has demonstrated consistent preferences for one or more items.
B. This is especially useful for those who need more structure.

Try it and See

Make a guess as to what might serve as an effective reinforcer, and then try it and see if it works.

Note: Regardless of the item/activity selected and its estimated value to the child, it *cannot* be considered an effective reinforcer unless the contingent delivery of that item or activity results in an increase in or maintenance of the target behavior.

2. Hall and Hall (1980) suggest the following nine-step sequence for selecting potential reinforcers:

Step 1: "Consider the age, interests and appetites of the person whose behaviors you wish to strengthen." The teacher should select potential consequences that attempt to correspond to the chronological age and social background of the student. The offering of Fruit Loops or an opportunity to work with puzzles will probably have little motivational value to an adolescent.

Step 2: "Consider the behavior you wish to strengthen through reinforcement." The teacher should select potential consequences that attempt to correspond to the value, or effort required to produce the response. "If an employer offered to buy an employee a cup of coffee for working all weekend on a special job it would be unlikely that any worker would accept the offer." Similarly, offering a student five additional minutes of free time for completion of an entire day's written assignment is an opportunity the student will probably pass up.

Step 3: "List potential reinforcers considering what you know of the person, his or her age, interests, likes and dislikes and the specific behavior you have defined." This step allows the teacher to organize the potential reinforcers she is considering in an orderly and objective manner. Hall and Hall (1980) suggest that the potential reinforcers be organized according to categories, such as material reinforcers, activity reinforcers, and social reinforcers.

Step 4: "The Premack Principle." When selecting potential reinforcers, the teacher should consider watching the student and noting activities in which he likes to engage. The use of preferred activities as reinforcers was systematized by David Premack (1959).

Step 5: "Consider asking the person." The teacher should remember that the best authority on the likes and dislikes of a student is that student. The mechanism most often used to determine a student's potential reinforcers is the Reinforcer Menu.

Step 6: "Consider novel reinforcers." With this step Hall and Hall (1980) remind teachers that "varying the reinforcers is more effective than using the same reinforcers over and over." Repeated use of the same reinforcer can lead to boredom and satiation, lessening the motivating effectiveness of a consequence.

Step 7: "Consider reinforcers that are natural." The authors suggest three advantages to the use of natural reinforcers. First, natural reinforcers such as recognition and privileges can be provided more easily and at lower cost than most edible and material consequences. Second, natural reinforcers are more likely to be available to the student after the behavior has been established. "In a natural situation, even though you discontinue to systematically reinforce the behavior you wanted to strengthen, the natural positive consequence you provided is more likely

to be available on at least some occasion in the future." Third, natural reinforcers automatically occur on a contingent basis. Praise for a homework assignment well done will not naturally occur unless the behavior was performed.

Step 8: "Select the reinforcer or reinforcers you will use." Once the teacher has considered Steps 1-7, the authors suggest that the teacher now select the reinforcers that will most likely have the desired effect on the target behavior.

Step 9: "Make a record of the behavior." The teacher is reminded that the only way to confirm a consequence as a reinforcer is to observe its effect on the behavior. To objectively verify this effect the teacher should systematically document the change, if any, in the production of the behavior. (From: Hall, R.V. and Hall, M.C. (1980), *How to select reinforcers.* Lawrence, KS: H & H Enterprises, Inc.)

APPENDIX D

Motivational Strategies: Lap tally charts

One way to maintain interest during the exercise program is to have the participants monitor their progress. You may want them to monitor the number of laps they ran, or the number of minutes they exercised, or their exercise heart rates. Whatever you select, we found that students enjoyed having a visual "progress report." Some ideas for keeping track of the students progress are presented below.

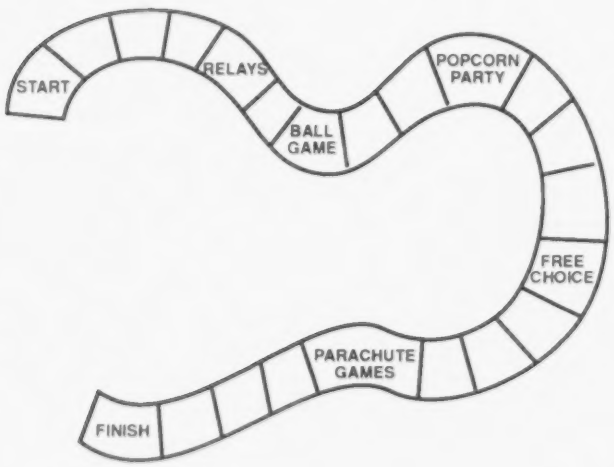
Equipment: 1) lap tally chart with each child's name and a velcro strip glued beside it.
2) red and green circles with a small piece of velcro glued to the backs.

Procedure:
1) Determine the number of laps each participant can reasonably complete during the 20-minute aerobic workout. This number will be the "required" number of laps. Attach the "required" number of red circles to the velcro strip next to the student's name before the start of the session (Note: each participant can have a different number of required laps).
2) During the session, as the student pair walks or jogs past the chart a red circle will be removed by a nonhandicapped peer assigned to this task.
3) If the student dyad completes the "required" laps (all red circles removed), then green circles are added for each additional lap completed.
4) Points are awarded as follows.
   1 point for completing the "required" laps
   1-2 points for completing additional laps
   5 bonus points if all the student dyads complete the required laps

5) Once the students have accumulated a predetermined number of points, they receive a "prize" of their choice (See t-shirt as a suggestion for a prize).

Variations: Lap Tally Race Track: Rather than using the chart with circles, you might use a racetrack format (below), where if the students accumulate a predetermined number of points for the day, they can move the marker one space. If they reach a square with a sign indicating free play or activity, the following session should include the activity.

LAP TALLY RACE TRACK

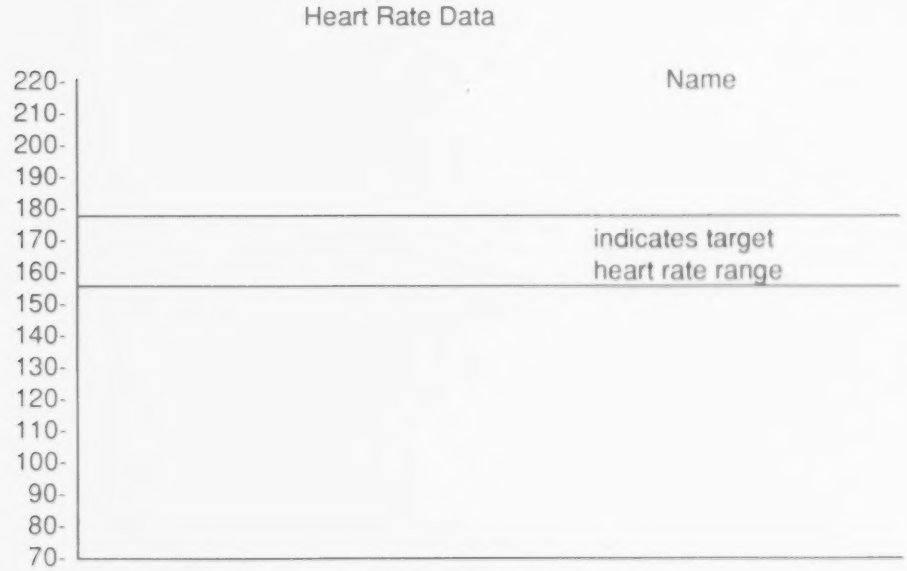


Key: 1. Each box represents 1 day of exercise

2. If the matter lands on a square with a sign (i.e., relay races, parachute games, free play), then the following exercise session should include that activity.

Motivational Strategies: Graphs

Equipment: Heart rate graph for each participant. The individually prescribed target heart rate range should be indicated (See example below).



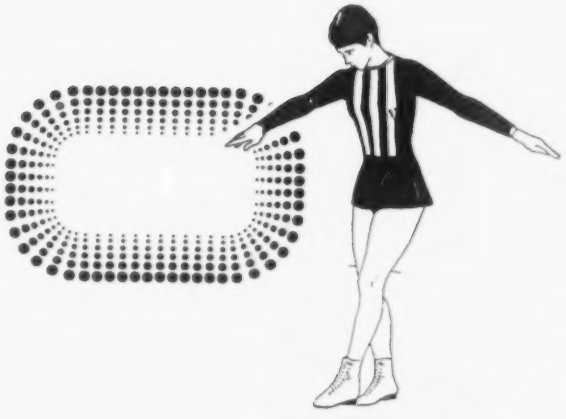
Procedure:
1) Retrieve minute by minute heart rate data from the memory of the heart rate monitor (See instructions for heart rate monitoring in the EVALUATION (Fitness) section in Chapter 4).
2) Determine the average heart rate for the exercise session by summing the heart rates and then dividing by the number of exercise minutes.
3) Graph the point.
4) Ask: Is the participant exercising in his/her target range?

Variation: Graph the number of exercise minutes or number of laps run.

Motivation Strategies: Notes and Letters

Examples of notes are presented on the following pages. Some just require copying while others have a blank space to write a short comment. The final example is in the form of a checklist. This example includes behaviors you might like to see from your nonhandicapped peers during the exercise sessions. You should select only those that are appropriate for your situation.

NOTES



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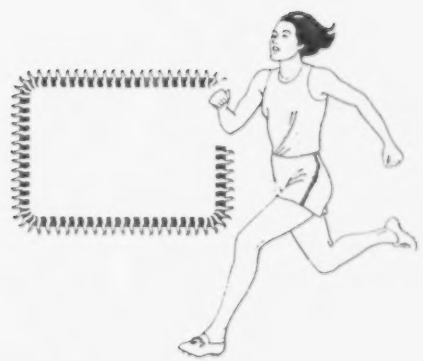
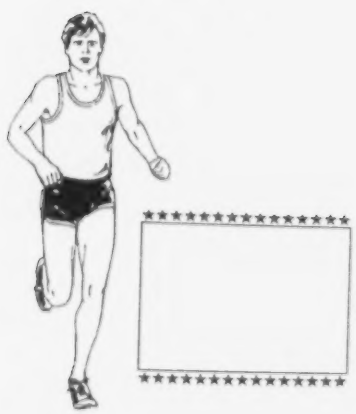
NOTES





LETTERS

PROGRESS REPORT

Name _____ Date _____

Procedural

__ You have done a great job of arriving to class on time.
__ You come to class in the proper exercise clothes.
__ When you arrive, you begin the exercise routine quickly.
__ You have done a great job following directions.
__ When it's time to go, you help put away the equipment.
__ When the session is over, you return to your class quickly and quietly.

Data Collecting

__ You have done a great job of keeping your partner exercising in his or her target range.
__ You have done a super job of completing your "required" laps.
__ You have consistently completed the "required" laps and gone on to run extra bonus laps.
__ You have done a super job of monitoring your partner's exercise heart rate.
__ You have done a neat job graphing the exercise data.

Social

__ You interact nicely with your partner. You have discovered what he or she likes.
__ You do a nice job of motivating your partner to continue walking or jogging.
__ You are enthusiastic.
__ Your partner looks like he or she is having fun.

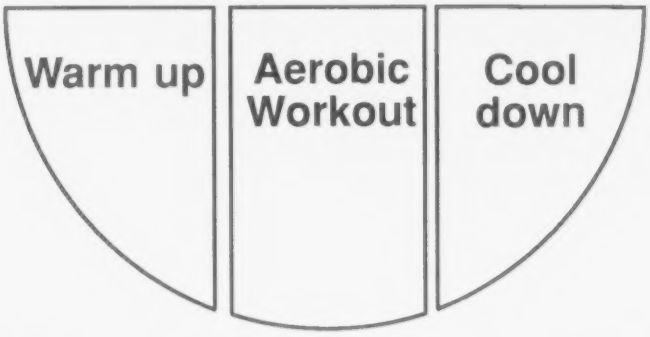
COMMENTS

APPENDIX E

Administrative Concerns

The materials that follow are samples of letters and forms that can be used prior to the start of the program in your school. There are three packets of information. The first packet is intended for the teachers and administrators of the program. It contains worksheets for you to use as you consider implementation of the PACP. It reviews the considerations presented in Chapter 6. The second packet is intended for the parents of all potential participants in your program. It contains a letter of explanation about the program and informed consent forms (one for students with handicaps and one for the nonhandicapped peers) for participation. The third packet is for the participant's physician. It includes a letter of explanation as well as a medical clearance form. The physician is asked to give a brief health history and his or her recommendation regarding the student's participation in an aerobic exercise program.

These forms may or may not be required for the program to be implemented in your school. We have included them for your consideration.



Warm up

Protocol:

Activities:

Aerobic Workout

Protocol:

Activities:

Cool down

Protocol:

Activities:

IDENTIFICATION OF PARTICIPANTS

STUDENTS WITH HANDICAPS

1. Need for aerobic exercise
2. Number
3. Degrees & type of handicap
4. Informed consent/ medical clearance
5. Other

NONHANDICAPPED PEERS

1. Same or similar age peers
2. Informed consent
3. Other

TEACHERS (of students with & without handicaps)

1. Interest
2. Time commitment

CONSIDERATIONS FOR IMPLEMENTATION

LOGISTICS
A. Time & space
B. Getting to & from class
C. Staff required

PROTOCOL

EVALUATION (aerobic fitness; program)
A. Heart rate monitoring
B. Lap/distance/time

MOTIVATION
A. What type reinforcers

Packet 2: Parent Letter

Fitness and Integration Project
(Your School)

Dear Parents:

We are planning to conduct a peer-mediated aerobic conditioning program this year in our school. The program was developed and tested as part of a federal grant at the University of Illinois. It is designed to facilitate the participation and maintenance of exercise for students with handicaps and to enhance interactions between nonhandicapped students and their peers with handicaps.

We have given this program our full consideration and we are very excited about getting it started in our school. We would like your child to participate in the program. In particular, students with handicaps will be given a fitness evaluation, and an individualized exercise prescription will be developed based on the results of this test. In addition, curriculum units designed to present pertinent background information on aerobic fitness and handicapping conditions will be presented to the nondisabled students. All participants will exercise together three times per week.

The purpose of this letter is to request that you and your child consider his or her participation in this project. Please read the enclosed material carefully and discuss it with your child. Should your child be interested and willing to participate, please complete the "Informed Consent for Participation" form. Please return it with your child to his or her classroom teacher.

Please feel free to contact us if you have any questions concerning these forms. We are very excited about this program and appreciate your consideration.

Sincerely,

**Should a medical release form be required in your school, you might include the following statement:

Also, as part of a routine procedure for projects involving exercise, we must have a medical release from your child's physician before he/she can participate in the program. We have enclosed a packet of materials explaining the project to your child's physician. Please *sign the cover letter to the doctor.* Then, send the packet to your child's physician for completion. Your physician should mail the form to our school office as soon as possible.

Form for students with disabilities

Informed Consent for Participation

Name of Child_____ Date_____

1. Explanation of exercise evaluation & prescription

As a participant in the exercise program, my child will be given an exercise evaluation including a health history, body structure and composition measurements, and a graded exercise test. The results of these evaluations will be used to develop an individualized exercise program to help ensure safe and effective exercise.

2. Explanation of daily exercise sessions

After completing the exercise evaluation, my child will exercise with a nonhandicapped peer in three or four weekly sessions for 10-15 weeks. Information on his or her daily performance will be recorded by the exercise partner.

3. Benefits to be expected

Participation in this project may or may not benefit my child in any way. The results obtained should help in evaluating a safe and effective level of exercise for him or her. No assurance can be given that the exercise program will increase his or her fitness level, although widespread experience indicates that improvement is usually achieved. The risks are minimal and are those associated with any physical activity: transient fatigue, breathing discomfort, and minor muscle soreness may develop at times.

Participation in the program also provides an opportunity for my child to interact with other handicapped and nonhandicapped peers.

I hereby voluntarily consent to my child's participation in the project described above. I have read and understand the objectives and procedures of the project in which my child will be engaged. I understand that the information obtained will be treated as privileged and confidential and will not be released or revealed to any person without my written consent. The information obtained, however, may be used without identification for a scientific purpose with my child's right of privacy retained. I also understand that I have the right to withdraw my child from the project at any time.

_____ _____

Signature of Parent or Guardian Phone

_____ _____

Signature of Project Staff Date

Form for nondisabled students

Informed Consent for Participation

Name _____ Date _____

1. Explanation of role as nonhandicapped peer

As a nonhandicapped peer, you will participate in a training program comprised of a curriculum unit designed to give you pertinent background information on handicapping conditions. As part of the training you will practice the routines planned for the daily exercise sessions.

After completing the training program, you will help implement the exercise sessions. You will exercise with your peer in three weekly sessions and record data from these sessions.

2. Benefits to be expected

Participation in this project may or may not benefit you directly in any way. You will be provided with new information on handicapping conditions, and an opportunity to interact with other handicapped and nonhandicapped peers.

No assurance can be given that your participation will increase your fitness level, although improvement may be achieved. Periodic field tests will be conducted to monitor any changes in your fitness level that occur during the course of the program. The risks involved are minimal and are those associated with any physical activity: transient fatigue, breathing discomfort, and minor muscle soreness may develop.

I hereby voluntarily consent to participate in the project described above. I have read and understand the objectives and procedures of the project in which I will be engaged. I understand that the information obtained will be treated as privileged and confidential and will not be released or revealed to any person without my written consent. I also understand that I have the right to withdraw from the project at any time.

_____
Signature of Volunteer

_____ Date _____
Signature of Parent or Guardian

Packet 3: Physician Letter

Fitness and Integration Project
(Your School)

Dear Doctor:

My child, _____, has been selected as a possible participant in the Fitness and Integration Project at Your School. The intent of the project is to improve physical fitness and promote integration in the context of a peer-mediated aerobic conditioning program.

A medical clearance form must be completed by you before my child will be allowed to participate in the project. Enclosed is a description of the exercise components of the project and a medical clearance form. I would appreciate your completing and returning the form to the address above as soon as possible.

Thank you for your cooperation.

Sincerely,

_____
(signature of parent or guardian)

Fitness and Integration Project
(Your School)

Dear Doctor:

Out of a concern for the need to improve physical fitness of students with disabilities, we are implementing a peer-mediated aerobic conditioning program in our school. The purpose of this letter is to describe the measures and procedures of the exercise program, and to request that you complete and return the medical clearance form for your patient.

The exercise program contains two essential components: evaluation and exercise.

EVALUATION: The students with handicaps will be given an exercise evaluation. The following measures will be collected:

1. Body Structure and Composition Assessment: height, body weight, and subcutaneous fat (measured externally with hand calipers).
2. Graded Exercise Test: The student will be asked to voluntarily walk on a motorized treadmill utilizing progressive increments of work until the targeted heart rate is achieved, muscular fatigue occurs, or symptoms indicating possible adverse reaction are noted. The entire testing procedure will be closely monitored by the technicians in attendance with an electrocardiogram and blood pressure recorded at appropriate intervals. Your patient's cardiovascular fitness level will be assessed using a submaximal graded exercise test for which the results will be projected to estimate the maximal oxygen consumption and heart rate. Information collected during this evaluation will be incorporated into an exercise prescription written by an exercise specialist following the guidelines established by The American College of Sports Medicine. An explanation will be given to the student, the parents, the teacher, and a copy of the prescription will be sent to you.

EXERCISE: Supervised sessions will be held three or four times per week for 30 minutes in the child's school. Each session will begin with a warm-up period followed by a 15-20 minute aerobic exercise period and will end with a cool-down period. Records will be kept to monitor the progress of each student and changes in individual exercise prescriptions will be made accordingly.

We would appreciate your completing the enclosed medical clearance and sending it to the school office. Please notify us if you have any questions about the program. Thank you for your cooperation.

Sincerely,

Medical Clearance

FITNESS AND INTEGRATION PROJECT
MEDICAL CLEARANCE

NAME _____

DATE _____ DATE OF BIRTH _____

CIRCLE ONE

1. GENERAL MEDICAL HISTORY
   Major illnesses in the past? (give dates) Yes No
   _____
   _____
   Any hospitalization? _____ Yes No
   _____
   Diabetes? _____ Yes No
   Family history of diabetes? Who? _____ Yes No
   Family history of heart disease? Who? _____ Yes No
   _____
   Family history of high blood pressure? Who? _____ Yes No
   _____

2. CARDIO-RESPIRATORY HISTORY
   Any heart disease now? _____ Yes No
   Specify: _____
   _____
   Any heart disease in past? _____ Yes No
   Specify: _____
   _____
   High blood pressure? _____ Yes No

3. MUSCULAR HISTORY
   Any muscle injuries or illnesses now? _____ Yes No
   Specify: _____
   _____
   Any muscle injuries or illness in past? _____ Yes No
   Specify: _____
   _____

4. BONE JOINT HISTORY
   Any bone or joint injuries or illnesses now? _____ Yes No
   Specify: _____
   _____
   Any bone or joint injuries or illnesses in past? _____ Yes No
   Specify: _____
   _____

SUMMARY IMPRESSION OF PHYSICIAN

1. Recommendations:
   a) There is no contraindication to participation in a moderately vigorous aerobic exercise program,

or

   b) Because of the above information, participation in a moderately vigorous aerobic exercise program may be advisable with the following restrictions:

   _____

or

   c) Because of the above information, participation in a moderately vigorous aerobic exercise program is inadvisable.

2. If you have circled (a) or (b) above, does the individual take any medications that should be considered in prescribing physical activity? If yes, please list _____

   _____

RELEASE

I hereby release the above information to the Project Director.

Date_____ Signed:_____

Physician Phone_____

Physician Address_____

APPENDIX F

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HANDICAPPING CONDITIONS CURRICULUM BIBLIOGRAPHY

Elementary/Middle School
Revised 1989

Books, Movies, and Filmstrips Appropriate for Sensitizing Elementary/Middle School* Students to Individual Differences and Disabilities

Compiled by Susan Hamre-Nietupski, Ph.D.,
University of Northern Iowa

Books

Accepting individual differences, Developmental Learning Materials. (Includes large chart-type books on mental retardation, physical disabilities, visual and hearing impairment)

Adams, B. (1979). *Like it is: Facts and feelings about handicaps from kids who know.* New York: Walker. (Several disabilities)

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Donovan, P. (1982). *Carol Johnson, the one armed gymnast*. Chicago: Children's Press. (Physical disability/limb deficiency)

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East, J. (1987). *Yes you can! A booklet to help young people with learning disabilities understand and help themselves*. Chicago, IL: National Easter Seal Society. (Learning disabilities)

Edrington, M. (1979). *Friends*. Monmouth, OR: Instructional Development Corporation. (Visual impairment, hearing impairment, physical disability, communication impairment, behavior disorder, moderate/severe mental retardation; caution: some children are integrated and some segregated)

Edwards, J., & Dawson, D. (1983). *My friend David: A source book about Down's Syndrome and a personal story about friendship*. Portland, OR: Ednick Communications, Inc. (Life story of a person with Down Syndrome)

Fanshawe, E. (1977). *Rachel*. Bradbury Press. (Physical disability)

Fassler, J. *Howie helps himself*. Albert Whitman and Company. (Physical disability)

Fireside, B. (1979). *A crow for courage*. Syracuse, NY: Human Policy Press. (Physical disability)

Forrai, M. A. (1976). *A look at physical handicaps*. Lerner Publications Co. (Physical disabilities)

Gackenbach, D. (1981). *A bag full of pups*. New York: Clarion Books. (Not a book about disabilities; a man with blindness is infused as a background character)

Glazzard, M. H. (1978). *Meet Camille and Danille*. Lawrence, KS: H & H Enterprises, Inc. (Hearing impaired)

Glazzard, M. (1978). *Meet Danny: He's a special person - Multiply handicapped*. Lawrence, KS: H & H Enterprises, Inc. (Multiple disabilities)

Glazzard, M. (1978). *Meet Lance. He's a special person - Trainable mentally retarded*. Lawrence, KS: H & H Enterprises, Inc. (Mental retardation)

Glazzard, M. (1978). *Meet Scott: He's a special person - Learning disability*. Lawrence, KS: H & H Enterprises, Inc. (Learning disabilities)

Gold, P. (1975). *Please don't say hello*. New York: Human Sciences Press. (Autism)

Goodsell, J. (1965). *Katie's magic glasses*. Boston: Houghton Mifflin Co. (Visual impairment)

Grealish, C., & VonBraunsberg Grealish, M. (1975). *The snealy-mouthed snerds and the wonderoctopus.* Syracuse, NY: Human Policy Press. (Any differences/disabilities)

Greenfield, E. (1980). *Darlene.* New York: Methuen. (Physical disability)

Grieg, D. & Brightman, A. J. (Eds.). (1978). *Laurie.* New York: Scholastic Book Services. (Blindness)

Heide, F. (1970). *Sound of sunshine, sound of rain.* New York: Parents' Magazine Press. (Blindness)

Hirsch, (1977). *My sister.* Minneapolis, MN: Carolrhoda Books. (Mental retardation)

Hunt, N. *World of Nigel Hunt: The diary of a mongoloid youth.* Garrett Publications. (Mental retardation)

Jensen, V. A. (1983). *Catching: A book for blind and sighted children with pictures to feel as well as to see.* Odense, Denmark: AiO and Storm Co. (Visual impairment; includes raised shapes to feel)

Keller, H. (1982). *Cromwell's glasses.* Greenwillow. (Visual impairment)

Krauss, B. (Ed.). (1979). *An exceptional view of life: The Easter Seal story.* Norfolk Island, Australia: Island Heritage Limited. (Physical disabilities)

Kube, C. (1981). *Special friends: Coloring book.* University of Hawaii, Department of Special Education. (Physical disabilities)

Lasker, J. *He's my brother.* Albert Whitman & Co. (Learning disabilities)

Lasker, J. (1980). *Nick joins in.* Albert Whitman & Co. (Physical disability)

Levine, E. S. (1974). *Lisa and her soundless world.* Human Sciences Press. (Hearing impairment)

Litchfield, A. B. (1976). *A button in her ear.* Albert Whitman & Co. (Hearing impairment)

Litchfield, A. B. (1977). *A cane in her hand.* Albert Whitman & Co. (Visual impairment)

Litchfield, A. B. (1982). *Captain Hook, that's me.* Walker. (Physical disability)

Little, J. *Mine for keeps.* Boston: Little, Brown. (Physical disability)

Mack, N. (1976). *Tracey.* Raintree Publications Ltd. (Physical disability)

MacLachlan, P. (1980). *Through Grandpa's eyes.* New York: Harper & Row. (Blindness)

Malone, M. (1971). *Annie Sullivan.* New York: Putnam. (Visual impairment)

Marcus, R. B. (1981). *Being blind.* Hastings House. (Blindness)

Mathis, S. B. (1973). *Ray Charles.* New York: Crowell. (Visual impairment)

McConnell, N. P. (1982). *Different and alike.* Current, Inc. (Several disabilities)

Mental retardation. Channing L. Bete Co., 45 Federal St., Greenfield, MA 01301. (Pamphlet on mental retardation)

Montgomery, E. R. (1978). *The mystery of the boy next door.* Champaign, IL: Garrard Publishing Co. (Deafness)

Ominsky, E. (1977). *Jon O. A special boy.* Englewood Cliffs, NJ: Prentice Hall, Inc. (Down's syndrome)

Parker, M. *Horses, airplanes, and frogs.* Child's World. (Blindness)

Payne, S. (1982). *A contest.* Minneapolis, MN: Carolrhoda Books. (Physical disability - cerebral palsy)

People just like you. Committee on Youth Development, Washington, DC.

Peter, D. (1977). *Claire and Emma.* John Day Co. (Hearing impairment)

Peterson, J. W. (1977). *I have a sister: My sister is deaf.* New York: Harper-Row. (Deafness)

Peterson, P. (1974). *Sally can't see.* New York: John Day Co. (Visual impairment)

Powers, M. E. (1986). *Our teacher's in a wheelchair.* Niles, IL: Albert Whitman & Co. (teacher of young children has a physical disability)

Pursell, M. (1976). *A look at physical handicaps.* Lerner Publications Co., Inc. (Physical disabilities)

Prall, J. (1985). *My sister's special.* Chicago: Children's Press. (Multiple disabilities)

Quicke, John (1984). Disability in modern children's fiction. Cambridge, MA: Brookline Books. (Adult reference book in children's literature)

Rabe, B. (1981). The balancing girl. New York: E. P. Dutton & Co., Inc. (Physical disability; girl uses wheelchair and crutches)

Rappaport, E. (1969). *Banner forward: The pictorial biography of a guide dog.* New York: E. P. Dutton & Co., Inc. (Visual impairment and guide dog training)

Reuter, M. (1979). *My mother is blind.* Chicago: Children's Press. (Blindness)

Robinet, H. (1976). *Jay and the marigold.* Chicago: Children's Press. (Physical disabilities)

Robinet, H. (1980). *Ride the red cycle.* Boston: Houghton Mifflin. (Physical disability)

Rosenberg, M. B. (1983). *My friend Leslie: The story of a handicapped child.* Lothrop. (Multiply handicapped; deaf/blind)

Seeing eye dogs. Seeing Eye, Inc. (Comic books on guide dogs)

Small, M. (1978). *And Alice did the walking.* Oxford University Press. (Physical disabilities)

Spina Bifida Association. (1984). *Giant steps for Steven.* Available for 50¢ from Spina Bifida Association, 343 S. Dearborn St., Suite 137 (FC), Chicago, IL 60604. (Physical disability - spina bifida)

Smith, D. B. (1975). *Kelly's creek.* New York: Thomas Y. Crowell Company. (Learning disabilities)

Sobol, H. (1977). *My brother Steven is retarded.* New York: Macmillan Co. (Mental retardation)

Spense, E. (1972). *The nothing place.* Evanston, IL: Harper & Row. (Hearing impairment)

Stein, S. B. *About handicaps: An open family book for parents and children together.* Walker and Co. (Physical disabilities)

Sullivan, M. B. (1979). *Feeling free.* Reading, MA: Addison-Wesley Publishing Co. (Several disabilities)

Sullivan, M. B. & Bourke, L. (1980). *A show of hands: Say it in sign language.* Reading, MA: Addison-Wesley Publishing Co. (Sign language)

Thomas, W. (1980). *The new boy is blind.* New York: Messner. (Blindness)

Tusa, T. (1984). *Libby's new glasses.* New York: Holiday House. (Visual impairment requiring glasses)

Von Braunsberg-Grealish, M., & Grealish, C. (1975). *Amy Maura* Syracuse, NY: Human Policy Press. (Physical disability—cerebral palsy)

Wapnick, S., & Kimmel, E. (1982). *Friends after all: Sloppy Joe.* Portland, OR: Ednick Communications, Inc. (Physical disability; child uses wheelchair)

Wapnick, S., & Kimmel, E. (1982). *Friends after all: Monster day.* Portland, OR: Ednick Communications, Inc. (Physical disability; child uses wheelchair)

Wapnick, S., & Kimmel, E. (1982). *Friends after all: Don't give up.* Portland, OR: Ednick Communications, Inc. (Mental retardation)

Wapnick, S., & Kimmel, E. (1982). *Friends after all: The mystery at Paul's house.* Portland, OR: Ednick Communications, Inc. (Hearing impairment)

Wapnick, S., & Kimmel, E. (1982). *Friends after all: First date.* Portland, OR: Ednick Communications, Inc. (Visual impairment)

Winch, B. L. (1981). *Handicapped . . . How does it feel?* Rolling Hills Estates, CA: B. L. Winch Association. (Learning disability, physical disability, and mental retardation)

Wolf, B. (1977). *Anna's silent world.* Philadelphia: Lippincott. (Hearing impaired)

Wolf, B. (1976). *Connie's new eyes.* Philadelphia: Lippincott. (Blindness)

Wolf, B. (1974). *Don't feel sorry for Paul.* Philadelphia: Lippincott. (Physical disability - use of prosthetic limb)

Wosmek, F. (1976). *A bowl of sun.* Chicago: Children's Press Inc. (Blindness)

Wright, B. R. (1981). *My sister is different.* Milwaukee: Raintree. (Mental retardation)

Zelonky, J. (1980). *I can't always hear you.* Milwaukee: Raintree. (Hearing impaired girl in regular school)

Movies

The big yellow schooner to Byzantium. National Association for Retarded Citizens. (Discusses right to education for student with severe handicaps)

A day in the life of Bonnie Consolo. Arthur Barr Productions, Inc. (Physical disabilities)

Feeling free. Scholastic Publishing Co. (Six films about children with various disabilities)

Happy forward. Seeing Eye Inc. (Training seeing eye dogs)

Harold. From the "People you'd like to know" series. Encyclopedia Brittanica Corp. (Blindness)

Keep on walking. National Foundation March of Dimes. (Physical disability)

Leo Beuerman. (Physical disability) Available at UNI Curriculum Lab, Education Center.

Like you, like me. (Series of 10 films about events in lives of children with disabilities, including topics of epilepsy, behavior disorders, prosthetic, mental retardation, speech/hearing impairments, blindness, physical disabilities)

Mary. From the "People you'd like to know" series. Encyclopedia Brittanica Corp. (Hearing impairment)

Paige. From the "People you'd like to know" series. Encyclopedia Brittanica Corp. (Mental retardation - Down syndrome)

People . . . Different but alike (Little Bigots). (Deals with prejudices, including prejudices about people with disabilities)

People you'd like to know. Encyclopedia Brittanica Corp. (10 movies with introductory movie on P.L. 94-142; includes movies on Down syndrome, blindness, and hearing impairment)

Filmstrips

Charly (Flowers for Algernon). Wilmette, IL: Films, Inc., 1144 Wilmette Ave. (Mental retardation)

Hello everybody: About handicapped kids for kids. Stanfield Film Associates. (Includes mental retardation and five other disabilities)

Mimi - This is who I am. Guidance Associates. (Physical disability)

People say I'm slow. From the Understanding Differences set. Learning Tree Filmstrips. (Located in UNI Curriculum Lab, Education Center) (Mental retardation)

Understanding differences. Learning Tree Filmstrips. (Located in UNI Curriculum Lab, Education Center) (Includes one strip on mental retardation)

What is a handicap? BFA Education Media. (Includes filmstrips on mental retardation, physical disabilities, hearing impairment and behavior disorder)

Other

Puppets with individual differences. J & H Heart Co., 118 N. Page St., Stoughton, WI 53584. (Several disabilities)

The kids on the block puppet show. Kids on the Block, Inc., Suite 510, Washington Bldg., Washington, DC 20205. (Several disabilities)

Middle/High School
Revised 1989

Books, Movies, and Filmstrips Appropriate for Sensitizing Middle/High School* Students to Individual Differences and Disabilities

Compiled by Susan Hamre-Nietupski, Ph.D.,
University of Northern Iowa

Books

Albert, L. (1976). *But I'm ready to go.* Bradbury. (Mental retardation)

Allen A. (1981). *Sports for the handicapped.* New York: Walker. (Several disabilities)

Armer, A. (1963). *Screwball.* Cleveland: World Publishing Co. (Physical disability - polio victim)

Azarnoff, P. (1983). *Health, illness and disability: A guide to books for young children and young adults.* New York: R. R. Bowker. (All handicaps)

Baskin, B. H. & Harris, K. H. (1977). *Notes from a different drummer - A guide to juvenile fiction portraying the handicapped.* New York: R. R. Bowker. (Several disabilities)

Berger, G. (1979). *Physical disabilities.* New York: Watts. (Physical disabilities)

Bookbinder, S. (1978). *Mainstreaming: What every child needs to know about disabilities.* Exceptional Parent Press. (Several disabilities)

Brancato, R. (1977). *Winning.* New York: Alfred A. Knopf. (Physical disabilities)

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*Many of these materials could be used with both elementary and middle school students, although some materials may be considered more appropriate for one age group than another.

Branscrum, R. (1979). *For the love of Jody.* New York: Lothrop, Lee and Shepard Books. (Mental retardation)

Brooks, J. (1979). *The big dipper marathon.* New York: E. P. Dutton & Co. (Physical disability - polio)

Brown, R. (1975). *Find Debbie.* New York: The Seabury Press. (Behavior disorder)

Bunting, E. (1976). *One more flight.* New York: Frederick Warne and Co. (Behavior disorder)

Butler, E. (1980). *Cushla and her books.* Boston: Hornbrook. (Severely handicapped)

Byars, B. (1981). *The summer of the swans.* New York: Penguin Books. (Mental retardation)

Charlip, R., Ancona, M. B., & Ancona, G. (1974). *Handtalk: An ABC of finger spelling and sign language.* Parents' Magazine Press. (Sign language)

Cleaver, V. & Cleaver, B. (1973). *Me too.* Philadelphia: Lippincott. (Mental retardation)

Corcoran, E. (1974). *A dance to still music.* New York: Atheneum Publishing. (Hearing impairment)

Crossley, R., & McDonald, A. (1980). *Annie's coming out.* Victoria, Australia: Penguin Books. (Severe handicaps/physical disabilities)

Cunningham, J. (1970). *Burnish be bright.* New York: Pantheon-Random House. (Muteness)

Dahl, B. (1962). *Finding my way: An autobiography.* New York: E.P. Dutton & Co. (Visual impairment)

Drimmer, F. (1985). *The elephant man.* Toronto, Canada: General Publishing Co. (Neurofibromatosis/physical disability)

Donovan, P. (1982). *Carol Johnson, the one armed gymnast.* Chicago: Children's Press. (Physical disability/limb deficiency)

East, J. (1987). *Yes you can! A booklet to help young people with learning disabilities understand and help themselves.* Chicago, IL: National Easter Seal Society. (Learning disabilities)

Educating handicapped children. Channing L. Bete Co., 45 Federal St., Greenfield, MA 01301. (Pamphlet on P.L. 94-142 and several disabilities)

Edwards, J., & Dawson, D. (1983). *My friend David: A source book about Down's Syndrome and a personal story about friendship.* Portland, OR: Ednick Communications, Inc. (Life story of a person with Down Syndrome)

Frick, C. H. (1955). *Five against the odds.* New York: Harcourt, Brace & World, Inc. (Physical disabilities)

Friis-Baastad, B. (1967). *Don't take Teddy.* New York: Charles Scribner's Sons. (Mental retardation)

Garrigue, S. (1978). *Between friends.* Bradbury. (Mental retardation)

Gerson, C. (1978). *Passing through.* New York: Dial Press. (Physical disability)

Gilson, J. (1980). *Do bananas chew gum?* Lothrop. (Learning disabilities)

Grealish, C. & Grealish, M. J. (1978). *Hackett McGee.* New York: Scholastic Book Services. (Physical disability)

Greenberg, J. (1970). *In this sign.* New York: Avon Books. (Deafness)

Greenfield, E. & Revis, A. (1981). *Alesia.* New York: Putnam Publishing Group. (Physical disability)

Hall, L. (1982). *Half the battle.* New York: Charles Scribner's Sons. (Blindness)

Hall, L. (1985). *Just one friend.* New York: Charles Scribner's Sons. (Mental retardation)

Hamilton, V. (1982). *Sweet whispers, Brother Rush.* Philomel. (Mental retardation)

Hanlon, E. (1978). *It's too late for sorry.* Bradbury. (Mental retardation)

Hanlon, E. (1979). *The swing.* Bradbury. (Hearing impairment)

Harries, J. (1981). *They triumphed over their handicaps.* New York: Watts. (Several disabilities)

Haskins, J. (1978). *Who are the handicapped?* Doubleday. (Several disabilities)

Hayman, L. (1982). *Triumph! Conquering your physical disability.* Messner. (Physical disability)

Heide, F. P. (1978). *Secret dreamer, secret dreams.* Philadelphia: Lippincott. (Caroline cannot speak, read, or write)

Heide, F. (1970). *Sound of sunshine, sound of rain.* New York: Parents' Magazine Press. (Blindness)

Helms, T. (1978). *Against the odds.* New York: Crowell. (Physical disability)

Hermes, P. (1983). *Who will take care of me?* New York: Harcourt, Brace and Jovanovich. (Mental retardation)

Hocken, S. (1978). *Emma & I.* New York: E.P. Dutton & Co. (Visual impairment)

Howard, E. (1984). *Circle of giving.* Canada: McClelland & Stewart, Ltd. (Physical disability—cerebral palsy; Caution—uses terminology such as "victim" of cerebral palsy)

Hunt, N. *World of Nigel Hunt: The diary of a mongoloid youth.* Garrett Publications. (Mental retardation)

Hunter, E. F. (1963). *Child of the silent night: The story of Laura Bridgman.* Boston: Houghton Mifflin. (Deaf/blindness)

Hunter, E. (1969). *Sue Ellen.* Boston: Houghton Mifflin. (Learning disabilities)

Hyman, J. (1981). *Deafness.* Hastings House. (Deafness)

Jacobs, L. (1975). *Wilma Rudolph: Run for glory.* EMC. (Physical disability)

Kilmont, J. *Long way up* (The other side of the mountain). Scranton, PA: Harper & Row. (Physical disability)

Kingman, L. (1978). *Head over wheels.* Boston: Houghton Mifflin. (Physical disability)

Koob, T. (1969). *The deep search.* Philadelphia: Lippincott. (Mental retardation)

Krauss, B. (Ed.). (1977). *An exceptional view of life: The Easter Seal story.* Norfolk Island, Australia: Island Heritage Limited. (Physical disabilities)

Krents, H. (1972). *To race the wind: An autobiography.* Putnam. (Visual impairment)

Landvater, D. (1976). *David.* Englewood Cliffs, NJ: Prentice-Hall. (Physical disability)

Levinson, M. (1985). *And don't bring Jeremy.* New York, NY: Holt, Rinehart, and Winston. (Learning disability)

Little, J. (1977). *Listen for the singing.* New York: E.P. Dutton & Co. (Visual impairment)

Little, J. (1970). *Look through the window.* New York: Harper & Row. (Mild handicap)

Little, J. (1962). *Mine for keeps.* Boston: Little, Brown. (Physical disability)

Martin, A. (1984). *Inside out.* New York, NY: Holiday House. (Autism; caution: emphasizes segregated school education)

Melton, D. (1976). *A boy called hopeless.* Independence, MO: Independence Press. (Brain damage)

Mental retardation. Channing L. Bete Co., 45 Federal St., Greenfield, MA 01301. (Pamphlet on mental retardation)

Milton, H. H. (1980). *Blind flight.* New York: Watts. (Visual impairment)

Neimark, A. E. (1983). *A deaf child listened: Thomas Gallaudet, pioneer in American education.* New York: William Morrow & Company. (Hearing impairment)

Neimark, A. E. (1970). *Touch of light: The story of Louis Braille.* New York: Harcourt, Brace and Jovanovich. (Visual impairment)

Peare, C. O. (1959). *The Helen Keller story.* New York: Crowell. (Deaf/blindness)

Peck, R. N. (1979). *Clunie.* New York: Alfred A. Knopf. (Mental retardation)

Perske, R. (1984). *Show me no mercy: A compelling story of remarkable courage.* Nashville: Abingdon Press. (Adolescent with Down syndrome who goes to regular school)

Perske, R. (1986). *Don't stop the music.* Nashville, TN: Abingdon Press. (Physical disability—cerebral palsy)

Quicke, J. (1984). *Disability in modern children's fiction.* Cambridge, MA: Brookline Books. (Adult reference book on children's literature)

Pollock, P. (1982). *Keeping it secret.* New York: Putnam. (Hearing impairment)

Richmond, S. (1983). *Wheels for walking.* Boston, MS: Atlantic Monthly Press. (Physical disability)

Riskind, M. (1982). *Apple is my sign.* Boston: Houghton Mifflin. (Hearing impairment)

Robinson, V. (1965). *David in silence.* Philadelphia: Lippincott. (Deafness)

Rodowksy, C. F. (1976). New York: Watts. (Mental retardation/ Down syndrome)

Roy, R. (1981). *Frankie is staying back.* Houghton/Clarion. (Learning disabilities)

Sallis, S. (1980). *Only love.* New York, NY: Harper and Row Publishers, Inc. (Physical disability)

Savitz, H. (1978). *Wheelchair champions: The story of wheelchair sports.* New York: Crowell. (Physical disabilities)

Seeing eye dogs. Seeing Eye, Inc. (Comic books on guide dogs)

Searl, S., & Taylor, S. (Eds.) (1985). *Portraits in black and white: Images of the institutions.* Syracuse, NY: Human Policy Press. (High school level study of inhumane conditions in institutions)

Sherburne, Z. (1974). *Why have the birds stopped singing?* New York: William Morrow. (Epilepsy)

Shyer, M. F. (1978). *Welcome home, Jellybean.* New York: Charles Scribner's Sons. (Mental retardation)

Slepian, J. (1980). *The Alfred summer.* New York: Macmillan. (Mental retardation)

Slepian, J. (1981). *Lester's turn.* New York: Macmillan. (Mental retardation and cerebral palsy)

Spence, E. (1973). *The nothing place.* New York: Harper & Row. (Hearing impairment)

Voight, C. (1982). *Dicey's song* (a sequel to Homecoming). New York: Atheneum. (Learning disabilities)

Walker, P. (1973). *Twyla.* Englewood Cliffs, NJ: Prentice Hall. (Learning disability)

Weiss, M. (1980). *Blindness.* New York: Watts. (Blindness)

Weiss, M. (1976). *Seeing through the dark: Blind and sighted - A vision shared.* New York: Harcourt, Brace and Jovanovich. (Visual impairment)

Wolf, B. (1976). *Connie's new eyes.* Philadelphia: Lippincott. (Blindness)

Young, H. (1980). *What differences does it make, Danny?* London: Andre Deutsch, Ltd. (Epilepsy)

Movies

The big yellow schooner to Byzantium. National Association for Retarded Citizens. (Discusses right to education for children with severe handicaps)

Coming home. Stanfield House. (Mental retardation)

David. Film Makers Library. (Down syndrome)

A day in the life of Bonnie Consolo. Arthur Barr Productions, Inc. P.O. 5667, Pasadena, CA 91107 (Physical disabilities)

Everyday people. Wisconsin State Council, Knights of Columbus. (Mental retardation)

Harold. From the *People you'd like to know* series. Encyclopedia Brittanica Corp. (Blindness)

Keep on walking. National Foundation March of Dimes. (Physically handicapped)

Leo Beuerman. (Physical disability) Available at UNI Curriculum Lab, Education Center.

Like other people. Perennial Education, Inc. (Physical disabilities)

Mary. From the *People you'd like to know* series. Encyclopedia Brittanica Corp. (Hearing impairment)

Meeting the challenge. Seeing Eye Inc. (Blindness)

Nicky: One of my best friends. McGraw-Hill Films. (Cerebral palsy)

Paige. From the *People you'd like to know* series. Encyclopedia Brittanica Corp. (Mental retardation - Down syndrome)

People you'd like to know. Encyclopedia Brittanica Corp. (10 movies with introductory movie on P.L. 94-142; includes movies on Down syndrome, blindness, and hearing impairment)

What do you do when you see a blind person. American Foundation of the Blind. (Blindness)

Filmstrips

Charly (Flowers for Algernon). Wilmette, IL: Films, Inc., 1144 Wilmette Ave. (Mental retardation)

Children with handicaps, families who care. Parents' Magazine Films, Inc. (Includes information on legal rights and filmstrips on support from the family educators, helping professions, and community)

Hello everybody: About handicapped kids for kids. Stanfield Film Associates. (Includes mental retardation and five other disabilities)

Mimi - This is who I am. Guidance Associates. (Physical disability)

People say I'm slow. From the Understanding Differences set. Learning Tree Filmstrips. (Located in UNI Curriculum Lab, Education Center) (Mental retardation)

Understanding differences. Learning Tree Filmstrips. (Located in UNI Curriculum Lab, Education Center) (Includes one strip on mental retardation)